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ABSTRACT

This booklet is intended for integrating environmental education into the school curriculum. It is divided into five sections. The overview section establishes the philosophical basis for environmental education. Section II, the largest section of the book, consists of a series of profiles which, in the case of this booklet, are brief portraits of people and places of interest to environmental education within the State of Massachusetts. The third section of the booklet includes program abstracts of environmental education programs functioning in Massachusetts. The fourth section includes a discussion of potentially useful resources and how best to utilize them. A listing of resources for Massachusetts is also provided. The fifth section contains a short concluding discussion. (RE)

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RESOURCES FOR SCHOOLS

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12. OPTIONS IN ENVIRONMENTAL EDUCATION

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12. OPTIONS IN ENVIRONMENTAL EDUCATION

BY

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RESOURCES FOR SCHOOLS is a series of publications developed by the Massachusetts Dissemination Project (MDP) for Massachusetts educators, parents, and students. The project, funded by the National Institute of Education, has four major goals:

- to stimulate greater awareness of the resources available to Massachusetts schools;
- to provide educators, parents, and students with specific information about resources and materials for school programs and services;
- to assist regional education centers and the Department in increasing and improving information services to educators, parents, and students in the state;
- to encourage greater exchange and sharing of resources among educational organizations, service providers, the Department of Education and its regional education centers, and school personnel.

The project is located in the Department's Boston office. In addition, each regional center has designated a staff member who maintains continuous contact and involvement with project activities across the state, and is responsible for working with center staff to improve information and dissemination services in the center. Ultimately, the regional centers will function as switchboards--sometimes providing services directly to schools, other times connecting them with the many existing resources. The development of this series--as its name suggests-- is one way the project is helping make these connections. *Please contact a member of the project staff for more information about the series, the project, or the regional center nearest you.*

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1. A CATALOG OF PUBLICATIONS FROM THE MASSACHUSETTS DEPARTMENT OF EDUCATION (being revised)
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RESOURCES FOR SCHOOLS topics to look for in the future:

- | | |
|---------------------------------------|----------------------------------|
| • student rights and responsibilities | • community education |
| • related educational organizations | • sex equity training strategies |

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OPTIONS IN ENVIRONMENTAL EDUCATION is a book mostly about people and places. The people tend to be hard working, independent, committed, and giving. In many ways this is not my book at all, it is theirs. They are out doing the work, trying things, refining, struggling to come up with the best teaching methods. They are teachers in the best sense of the word. I learned an enormous amount from everyone I met during my search for environmental education in Massachusetts, and I owe all of them a great debt. They took time out from teaching their classes to teach me. To all of these people, I offer this small exploration of the world you work in and to which you dedicate yourselves. This is your book.

Nothing could have been accomplished on this book without the patient help and advice of the staff of the Massachusetts Dissemination Project, and to Judith Dortz and Cecilia DiBella of the Massachusetts Department of Education I owe the opportunity to try this at all. Their faith and aid have been instrumental in getting the publication finished. The contents have been the gift of many people who accepted my pestering questions, and without them there would be no book. Whatever is valuable in *OPTIONS IN ENVIRONMENTAL EDUCATION* I owe to all those mentioned above. Its faults are entirely my own.

J. Tevere MacFadyen
Summer 1979

I

ENVIRONMENTAL EDUCATION: AN OVERVIEW

"On the contrary, it is words that are vague. The reason why the thing can't be expressed is that it's too definite for language."

C.S. Lewis, Perelandra

This is a book about environmental education (EE) in Massachusetts schools during the late 1970's, almost a decade after Earth Day turned ecology from an academic discipline into a household word. The advent of the ecology movement prompted educators to leap into an apparent void with new and different ideas that came to be collectively known as environmental education. The world has changed considerably in the past nine years, and so have our schools, but environmental education in some form seems well entrenched. What has happened to the offspring of Earth Day? What does the second generation of environmental education look like? As the pressure on our limited natural resources grows, how is the educational community handling its responsibility to prepare a population to live?

This book is one attempt to provide some possible answers to these questions. It focuses on the variety of environmental experiences offered to Massachusetts students and the creative and unusual methods practitioners have developed of teaching environmentally. *OPTIONS IN ENVIRONMENTAL EDUCATION* explores the blending of people and surroundings into a community...for that is what environmental education is all about.

What exactly is environmental education? Ask environmental educators that question and you will get a lot of different answers. Teaching environmentally demands dedication and intuition, a willingness to draw upon many diverse sources, combining and contrasting. It requires that the teacher step into the realm of the uncertain. When you are studying the relationships of living and non-living things in communities there just is not much you can bank on as absolute fact, so the teacher must be prepared to not know the answers on occasion. This is not because the teacher is poorly prepared, only that there are no answers, just better questions. Risk-taking and questioning are essential to educating environmentally on any subject.

Environmental education is sixth graders who adopt the identities of long-deceased residents of Waterbridge and play a computer game in which their characters' lives roll off the rattling teletype in fine detail. What happens when the town builds a new road and the tanner's

trade expands? What happens to the stream beside the tannery, and to the farmer down stream when the water sours? Who wins and who loses, and how does the community change when the environment is manipulated?

Environmental education is high schoolers from a small city excited enough by a summer environmental project to start an extracurricular organization that investigates and researches community ecological issues. Convinced that the data they have collected indicates dangerous industrial pollution of a local river, and angry that the government agencies charged with regulating pollution have ignored the evidence, the students return to the mill they most suspect. Eventually they narrow down the worst offense not only to a specific factory, but to a single drainpipe at a certain time each day. They then call the agencies again and tell them exactly when and where the illegal discharge occurs. The mill installs anti-pollution equipment.

Environmental education is a school administrator who is concerned that students do not have enough personal challenge, outdoor experience, and the special kind of growth that comes of having taken risks. With like-minded teachers he wants to apply the Outward Bound concept throughout a student's school life. The efforts they make to integrate some of these concepts into the curriculum attract both teachers and students, and what starts as a small home grown project evolves into a nationally validated program and, curriculum development project.

Environmental education is junior high students who serve as crew members on a sixty-five foot commercial fishing and research vessel. They set and haul lobster traps. They drag an otter trawl, then identify the contents. They try modern equipment as well as the long lines, and baited hooks used by the Portuguese dorymen who brought commercial fishing to this coast. At the day's end they mop down the boat, stow the gear, and clean the catch. Some fish are preserved in formaldehyde, but many students return home with specimens that are preserved, briefly, with butter in a hot oven.

Any subject can be taught environmentally. The notion that environmental education is a body of facts, a discipline, is one of the most misleading and frustrating aspects of environmental education. Ecology is a subject. Environmental education is an approach. The two have much in common, but they are not the same. This erroneous notion is an obstacle in the path of everyone who wants to build an environmental outlook into education, not add it on like an "extra" frill. Unfortunately the words environmental education seem to have a magical power. They scare people. Teachers and administrators perfectly capable of teaching environmentally somehow feel they must be missing some mysterious training, or hardware, or

that the location of their school is not correct.

Environmental education is not ecological sciences. Some of the most valuable uses of the environment in teaching have nothing at all to do with science. Most environmental education programs do involve some study of scientific education method, mainly because science is a handy tool for studying communities. The analytic and yet general attitude that a scientist must adopt is useful, but environmental education need not be scientific. There is no reason why ecology, biology, meteorology, or any of the earth and ocean sciences should not be a big part of an environmental education curriculum, but there is no reason why they have to be either. In trying to figure out what makes education environmental, it helps to disentangle what environmental education is, from what it is not.

Another erroneous but widespread assumption is that environmental education means just field trips, expeditions, or outside projects. These activities certainly are a great attraction for students but environmental education can take place inside the classroom. You do not need sylvan woods and fields surrounding the school to provide an environmental education. The concepts central to learning how the pieces of a community interact, and why, are best learned by starting close to home and studying your own community. This can happen anywhere.

As soon as you accept the proposition that an environment is any community available for study, then studying communities simply becomes a matter of applying yourself to something close at hand. A frequent comment is that schools have no time or money for environmental education anymore. With declining enrollment, shrinking budgets, and concern about a return to the basics, schools do not feel justified in adding a new subject. But this is precisely the finest argument in favor of environmental education. Reading, writing, and arithmetic can certainly be taught with environmental methods, not to mention research methods for science and social science and less tangible things like ethics, citizenship, responsibility, and maturity. An environmental approach is unequalled as a means of transmitting basic facts in a relevant, concrete manner, providing students with the broadest of educational opportunities. Done well, it would be hard to imagine an environmentally taught discipline not expanding a student's experience while conserving limited school funds.

There is no simple definition. Environmental education is learning about the world we live in as it actually operates, and like the world, it refuses to be simplified, and neatly categorized into boxes. No matter how narrow the focus at the start, by thinking holistically or environmentally you will end up with more and more ramifications. That is the nature of

environments, and the essential lesson of environmental education: All things are connected to each other, and to you!

How do you illustrate this fact for children? Try asking a simple question. What happens when you flush a toilet? Simple, you say. The waste water washes down the drain. But to where? Into the septic system. Then where? Into the leaching field or treatment plant. Then where? Into a river, or ocean, or ground water aquifer. (If you've gotten this far you are doing well.) Then where? It evaporates off the surface of the ocean, or lake or whatever, forms clouds, condenses and falls back to the ground. This pursuit of the elusive flushed toilet will take you through pipes and wells, reservoirs and rivers, and eventually it will take you right back to the tank.

What really happens when you flush a toilet is that you fill the toilet back up. In a very direct sense, the water you flush out of it will return sometime to fill the bowl again. What you are dealing with here is cycles, and the interconnectedness of all things. When you undertake to discover what happens when you flush a toilet you can encounter the entire range of learning experiences addressed in basic education.

When you teach environmentally you look for the connections between things, incorporating parts of the surrounding community which will add life to the central subject under consideration. Often this can be done by looking more closely at something easily ignored or so obvious that we rarely take the time to examine it. Like flushing a toilet. For one science teacher in a high school the focus was weather. He enjoyed teaching weather patterns and forecasting because not only did the work cover several basic sciences but, "that way we have them in class all day. A kid looks up and sees a cloud, he knows what sort of cloud it is and what weather it is likely to bring. He is in my class then, and forty years later he will remember that class whenever he recognizes a weather pattern."

This lasting, grounded knowledge is one of the great benefits of environmental education. A student who learns to read the weather, or one who discovers how to write while telling a very personal and important story of his own experience halfway up a rock he is climbing, or one who masters water chemistry to determine specific pollution in his own town, is unlikely to let this education slip away. Giving kids a way to understand the world around them produces unmistakable pride and commitment. This may be why environmental education is so often successful with students who have difficulty with traditional approaches.

Not everything a student must learn will be

pleasant or exciting, but bringing in aspects of the student's own world will help. This raises a caveat: avoid the exotic. If you have a choice between exploring the schoolyard and watching a film of a volcano erupting on a Pacific atoll, stay in the schoolyard. Stick with the local, the immediate, and real. The commitment to locally based work probably accounts for why so few environmental programs use prepared texts of any sort.

Environmental education is many things to many people and this has some unfortunate implications. Because most programs are begun by teachers, mostly on their own time, they have a real stake in the health and longevity of their efforts. This demands much time and energy which limits communication among practitioners and stifles the growth born of contact among committed and experienced people.

Probably more dangerous, though, is what the lack of communication does to those who may be just considering a venture into environmental education. We have already seen that the field suffers from an image as something exotic, esoteric, expensive, and special. This can be compounded by the fact that the very people who are in a position to counter this misinformation are too busy to share their expertise. *OPTIONS IN ENVIRONMENTAL EDUCATION* is an attempt to alleviate this problem by providing both new and experienced people with a buffet of environmental programs.

The largest portion of this book consists of a series of PROFILES, thumbnail portraits of people and places. Because programs must be locally oriented, and no two situations or locations will be identical, an attempt is made to avoid the impression that a program can be transplanted intact from one place to another. Instead, we do suggest possible solutions to one school's problem by showing what other schools have done. For instance, if an agriculturally based project in the western part of the state earns its keep by selling flowers and produce within the school, then perhaps a marine fisheries effort on the coast might employ similar devices.

This book does not intend to single out a few programs to the detriment of others. On the contrary, profile subjects were chosen for their illustrative value. This is admittedly a subjective decision, and not meant in any way as a judgment. If we cannot define exactly what environmental education is, then how can we possibly make a value judgment about which programs are best? We cannot, and *OPTIONS IN ENVIRONMENTAL EDUCATION* does not.

The PROFILES present a sharper focus than abstracts alone can manage but the ABSTRACTS section fills out the general picture. Choices for PROFILE treatment may disappoint some people but the ABSTRACTS cover the variety and diversity of environmental education efforts. The few lines of an abstract hardly do justice to a program but they will encourage communication and the exchange of ideas. Facilitating these contacts and choices is a major function of dissemination and of this book.

The third major category included in the book is RESOURCES. This section is largely self-explanatory; we have collected a catalogue here of tools for the environmental educator.

Coupled with the PROFILES and ABSTRACTS we are attempting to do just one thing: Encourage!

And that is the message of this book. Do it! We can only be optimistic that *OPTIONS IN ENVIRONMENTAL EDUCATION* will help in some small way.

II PROFILES

Massachusetts is a big, sprawling, and multi-faceted state. It is not surprising that environmental education here should reflect this. From the Provincetown dunes to the Berkshire hills, Massachusetts encompasses an incredible range of landscapes and communities. Wilderness, rural agricultural, semirural, suburban, small cities, and dense metropolitan residential areas dot the state map. Many of these places are profoundly different from one another. So too are the varieties of environmental education offered in them.

The following pages are filled with visits to some of these programs and places. We have tried to capture the feelings and activities of environmental education there, and the attitudes of the people involved with making it happen. This is not a cookbook and there are no foolproof recipes, but the information in these profiles is presented in the hope that familiarity will breed experimentation, and especially that cross-pollination will eventually produce a better hybrid.

There are not many answers here, but you may come up with some better questions. There are so many ways that environmental education can be brought into a student's experience, and so many possible definitions of EE itself, that we have attempted a sort of smorgasbord. Some of the activities profiled occur in schools, some away from them. Some are geared for a certain student type, others for the general audience. Some programs are recipients of federal grants, while many are not. We have included a look at resources and activity outside schools which schools might take advantage of. Assembled, is a collage of the different ways that different people in different places approach environmental education, and it's important to note that these are not perfect models. They're on-going, growing and changing efforts. Learn what you can from these experiences but don't expect them to fit your situation exactly, because they won't. But the experiences of these people may help you.

PROJECT GREENTHUMB LUNENBURG

Like many recently built high schools, Lunenburg High is a single story brick structure with large wings grouped around a central courtyard. The courtyard, like most such courtyards, was until recently empty and little used. In the winter of 1977 the courtyard changed.

The center of attention in the courtyard now is a big quonset-type greenhouse with an attached potting shed. To one side is a long row of glass covered cold frames. The courtyard contains young fruit trees and a grape arbor, compost heaps and planting beds, hand laid slate walkways and newly terraced flower gardens. More significantly, the courtyard holds the collective efforts and dreams of a bunch of high school students and their teachers, participants in Lunenburg's Project Greenthumb. With help from their teachers and the school's maintenance personnel the Greenthumb students have built and are operating everything in the courtyard. They have transformed a dead space into a lively and handsome gathering place, and have received an education doing it.

Project Greenthumb is an environmental education project funded under Title IVC of the E.S.E.A., a source of much of the federal funding for EE in Massachusetts. Greenthumb began as a result of growing community concern over the polarization among students at the school, and an expressed desire for some integration of vocational training in an academic setting. Lunenburg residents were polled on their opinions about the high school, and one thing which came out loud and clear was unhappiness that students were dividing into rigid cliques. Community residents, and some teachers at the school, felt that education should act to heal divisions, not create them. Greenthumb was their response.

The balance of academic and vocational work is very important here. Ostensibly, Greenthumb is a drop-out prevention program. Students who have lost interest in the standard curriculum will be offered Greenthumb as an alternative. But project director Doug Fleming said that his students are tired of being seen as potential drop-outs. Though they are often routed into the program through the school guidance office, Fleming says the Greenthumb participants are "all different types. Sure we have potential drop-outs, and we lose a few now and then, but we've got college prep kids in here too, some slow learners and some real leaders." Fleming's point is that, in a way, all high school students are potential drop-outs. The concrete,

tangible educational experience offered by Greenthumb should not be restricted to a particular type of student. The Greenthumb approach uses practical training in horticulture and forestry to teach basic science (plant propagation, geology, silvaculture, botany, field biology, and natural history) concurrently with the building of employable skills.

Fleming explains that "Project Greenthumb is a program which develops job skills in horticulture and forestry, and provides an alternative educational experience. What has not been surfacing in the press releases is the kind of environmental education experience our students enjoy as they participate in the forestry, or natural resources phase of our program. The exploration of moist hemlock ravines, dry oak forests, and quaking bogs provides excellent experiences for understanding the inter-relationships between plants, animals, and their physical surroundings."

The horticulture aspect of Project Greenthumb includes operation of the greenhouse, where students raise cutting flowers and houseplants for sale and prepare seedlings for the summer vegetable garden, as well as the study of plant sciences. The forestry section spends time in the woods learning forestry practices hands-on, developing a working understanding of forest management techniques while pruning, thinning, cutting, and clearing. The students have cleared cross-country ski trails, built a log shelter for a warming hut, constructed a nature trail and thinned an overgrown lot. All this was done on town owned conservation land, and Greenthumb's services were duly noted with gratitude in the Town Report. What's especially interesting about Greenthumb is that the students enrolled in the program (forty this year) gain expertise in both fields. A student's concentration switches every three weeks, so that by the end of the school year they are capable in either forestry or horticulture, expanding their job prospects and giving a sense of achievement many have never felt before.

An important component of Greenthumb's apparent success is its emphasis on personal responsibility. Six students who participated in Greenthumb last year have returned as student leaders this year. All work done in the program, from trail cutting to greenhouse building, is done by self-organized teams of students. Though Greenthumb is officially listed as an elective alternative to Lunenburg High's general biology requirement, it offers skills more difficult to assess: self-assurance, maturity, and organizational ability. When the project visited a local saw mill it came as no surprise to Greenthumbers that the

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mill foreman would call his clipboard the most important tool he had. These students are being given a hardnosed taste of real work, learning to raise and market their own plants and establish contracts for their own services. But this experience is wedded to academic discipline in an unusual and exciting way, helping to break down social barriers among students as well as teaching them information they will need to survive in the world.

Like many EE efforts, Greenthumb does not separate activities by traditional sex stereotypes. One girl said to me, as she went off into a spruce grove with a long handled pruning saw, "I guess I'm learning to do real things, things I can see, and I like that."

Doug Fleming and the project staff hope that Greenthumb is doing real things the community can see as well, and he has high hopes for the project's continued operation after the grant expires. Meanwhile the Greenthumb students have work to do, finishing the interior of the potting shed and getting bulbs ready for spring sales.

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- Project Greenthumb is in the process of developing lesson plans and curriculum guides for the combined academic and vocational work in horticulture and forestry that the project offers. These materials will be distributed widely if the project is validated for dissemination during its funding period.

NEW ENGLAND AND THE SEA
TRITON REGIONAL HIGH SCHOOL, BYFIELD

On a bright morning in May the 65' charter fishing boat "Lady Anne" rocks gently on the swell over Jeffrey's Ledge, seventeen miles off the Massachusetts coast near the New Hampshire border. Her rails are bristling with rods and draped with hand lines as her passengers eagerly set out bait for cod, pollock, and haddock. Today's party is composed of junior high students, and if this does not sound much like school, it doesn't feel much like it either. Which may be part of its success. But the students have spent considerable time studying the history of commercial fishing in New England, past and present methods, the social and cultural impact of marine industries on their communities, as well as marine biology or oceanography, and fish identification. The boat's crew is a bit unusual too: certified teachers.

Already this morning the kids have pulled a string of lobster traps and set and hauled gill nets. Now they're experimenting with the traditional long-lines used by fishermen off this coast for centuries. The catch will be collected and identified, sorted according to species and habitat. Stomach samples will be analysed to determine the fish's diet, and specimens will be returned to the classroom preserved in fixatives for further study. But not all the fish will end up in bottles of alcohol. Quite a few of this morning's specimens will find their way into the oven, preserved in butter. "I probably shouldn't admit this," says the boat's captain with a grin, "but one of the most convincing arguments I've ever found for this sort of education is sending a kid home with a haddock."

Bill Eastman is the "Lady Anne's" captain and part owner. He is also a history teacher at Triton Regional High School and director of that school's NETS program (New England and The Sea). NETS takes advantage of Triton's rural, coastal setting to build an educational experience that is both relevant and ambitious. A day aboard the boat is the most dramatic aspect of NETS, and something students anticipate with pleasure, but it is only one part of a far reaching effort to ground their education in the natural and social history of their own region. At the bottom of NETS's operating philosophy is the belief that if education is locally oriented students may be motivated to learn more, and more completely.

"The academics are important of course," Eastman explains, "but I'd be satisfied, very satisfied in fact, if students in the program simply began to realize the dangers of harbor pollution. Because when they understand

that, they're understanding something about water oxygenation and the requirements of marine life for oxygen, and the fact that when you dump diesel all over the harbor that process is hindered, and that if oxygenation stops fish die, and if the fish die an industry goes too, an industry that's been essential to this area for hundreds of years." This is good environmental teaching, connecting causes and effects, or rather letting the student make connections through experience and observation. Doing this in a logical and graphic manner brings the lesson close to home. NETS does this in a variety of ways, and the common denominator is the sea.

"The Great Newbury Marsh Hike" is a three day exploration of the salt marsh that meanders through Newbury and Rowley, near the high school. Students set off in dories on a tidal stream to begin rowing and portaging their way to the tip of Plum Island, part of the Parker River Wildlife Preserve. The marsh hike is incorporated into students' history and physics classes, which combine for the field experience. The history class has studied the natural and cultural history of the area, patterns of civilization in surrounding towns and economic development. Physics students have investigated celestial navigation, tide action, and water physics. At night around the fire each group fills the other's gaps, creating an atmosphere of support and sharing. The hike is planned and organized entirely by students, who must gather the required gear, divide into teams and plot their own course through the maze of tiny channels.

In an interesting twist, a budget saver as well as an educational option, the dories used by students in the marsh hike are built at Triton by members of a boatbuilding extra-curricular club advised by a science teacher. The class not only builds dories but studies the history and evolution of seacraft and working vessels, an appropriate study for a community whose roots are tied to fishermen and boatbuilders.

A four day spring "Round Robin" gives 7th and 8th graders an intensive succession of out of the classroom experiences. Capitalizing on curriculum units in maritime history, the literature of the sea, ocean sciences, and creative writing, a year of inter-disciplinary study leads up to the "Round Robin." A day is spent exploring tide pools and sandy beaches at the Odiorne Point Nature Center. A walking tour through Newburyport is a discovery of history through architecture, as students learn the significance of widow's walks and captain's houses. A day spent as wandering poets, composing verse by the sea

and sharing it among the classes encourages expression and communications skills. And a voyage on the "Lady Anne" completes the kids' "Round Robin". The juxtaposition in close proximity of such diverse activities leads to a fuller understanding of both the unity and variety of the natural world, and its place in human history.

Of course not every school will have on staff a teacher whose family dates back to the area's first settlers, as Eastman's family does, and far fewer still will be fortunate enough to have a teacher who is a charter boat captain with his own vessel. But Eastman is quick to point out that these are not the key to NETS. They are nice, but not essential. The Title IVC grant Eastman won for the program has also helped, but Eastman claims that this is not critically important either. In fact, he wondered if the best programs weren't the ones that grew slowly without any grant at all, gaining increasing community support as they demonstrated their worth. He has to do this with NETS. He insists that any fishing town could charter a fishing boat, because spring is a slow season and the captain can be convinced to cut prices, especially if he's made to realize that his efforts are part of a community project to expand their school's offerings. That's the key to NETS. "In any given week," Eastman says of his deep community support, "I could bring out twenty-five parents to help run the program."

"It's not sophisticated equipment you need," he goes on, "It's just commitment. We've had tremendous help from the local fishing industry, and our teachers are really interested and committed. All I've really done is organize some activities that were already happening here at Triton and focus them. A history teacher interested in local history has developed a curriculum, an English teacher wants to study maritime literature. Anytime you get your staff really enjoying what they're doing, you've got a good program." Will his program continue after funding runs out? "I guarantee it. I wouldn't waste my time as director presiding over the dissolution of the program." Eastman is fulfilling this guarantee by building the components of NETS so thoroughly into the life of Triton Regional that they no longer appear as isolated activities, but as essential components of a student's education there. He'd like to market student caught fish at the school. That, he figures, would solidify his base, thereby keeping that haddock on the table.

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-- NETS has developed a thorough resource bibliography for marine studies, including fact sheets and article reprints. They are currently finishing a curriculum and course syllabus.

OUTDOOR EDUCATION PROGRAM

LANESBOROUGH

What motivated a very small school (less than four hundred students enrolled in grades K-6) in a very small town between Pittsfield and Williamstown in the Berkshire hills, to set up one of the earliest comprehensive environmental education programs in the state? Lanesborough Elementary School conducts at least one hundred and fifty outdoor or environmental experiences, ranging from schoolyard investigations to a five-day biology and natural history field trip which takes the entire sixth grade to Cape Cod. All this is done as a matter of course, without much fanfare. It is accepted as an important part of a student's elementary education. But this sort of program doesn't just happen on its own. Someone has to create it and run it. Why would a small teaching staff put in long extra hours to develop study guides for outdoor areas near the school?

"It's education for life," answers Tony Boyer, Lanesborough's Outdoor Education Coordinator and a teacher in the school, "We're helping kids grow into adults. That's our job, and they're going to do it out there," his hand sweeps across acres of woods and fields behind the school, "not in some brick building." The school's latest addition to an already strong commitment is a network of nature trails running out from the back door. The trails are thoroughly blazed, cut clearly enough to be easily followed by youngsters but not turned into the near highways that some over-blazed trails become. The area covers several forest types, a couple of old foundations overgrown with myrtle left by earlier settlers, lilac and quince gone wild, hedgerows and stone walls, an abandoned orchard, and a cornfield still in use.

These are the elements of the rural New England countryside, and hardly unusual, but how many of us grew up walking in these settings without realizing that a place's history can be traced in its fields? Students who learn that quince and lilac were planted to mark the entry of a farmhouse, that the quince fruit is high in pectin and served the farm wife as a natural preservative for jellies, and that long after the farm has disappeared the quince still flowers and fruits deep in a second growth forest, have gained more than a knowledge of facts. They have been given an introduction to the evolution of their region, have learned to use their senses in solving puzzles. They have been shown that a little digging tells a lot of stories. And that a walk in the woods can be a learning experience.

That's a single example of what Lanesborough students are offered during their ele-

mentary education. "It takes students out of abstract settings and gives them something to hang onto," says George St. Pierre, now superintendent of schools in Lanesborough, who was principal of the elementary school in the 1960's when Lanesborough's environmental programs began to grow. "The environmental component gives students some of the experiences necessary to their becoming not just better students, but better citizens as well."

St. Pierre says "We designed our program at coffee breaks, during free periods, over school lunches, in the teachers' room, any time we found the time. A lot of the work got done over late night beer and pizza sessions at my house!" A CETA grant provided the school with workers to build their new nature trail last summer. The cost of operating the whole program is kept low by integrating activities into the school, rather than having a single, high overhead endeavor.

Another aspect of the school's program is the peer teaching done for Lanesborough pupils by students in nearby Mt. Greylock Regional High School's Community Studies Program (also profiled in this publication). Mt. Greylock students teach Lanesborough youngsters the rudiments of field biology and environmental sciences, while providing role models for the younger children and helping to assure an easy transition for them from the small school into the larger one.

The sixth grade trip to the Cape is necessarily expensive. Transporting a large group of students across the state and housing and feeding them for a week is no small chore. This trip means a lot to the students, though. It's a chance to apply the work they have done at Lanesborough to a completely different environment, and for many it will be the high point of their school year. The thought that the Cape trip might be phased out for economic reasons prompts sixth graders each year to sponsor a magazine and newspaper drive, annually raising more than \$2000 toward the financing of their own trip.

Outdoor and environmental activities are so well woven into the fabric at Lanesborough that it may appear easier to accomplish than it is. Fourteen years experience helps a great deal, and over the course of time various Lanesborough teachers have contributed to a fat lesson guide that makes the fullest possible use of the outdoors around the school. The lessons emphasize sensory awareness and simple investigative techniques, but have strong components of math skills (measurement, rudimentary geometry, cartography), English and history (role playing, written journals, community

history), and art (sketching in field notebooks). The fact that this resource has been gradually assembled by a number of different teachers indicates a key facet of Lanesborough's approach: volunteers cope with the work load by spreading it around, and over time. At Lanesborough the importance of environmental experience is recognized as a long term thing. Thus the program built at the school leans heavily toward continuity.

This dedication is added to what Boyer calls "whole hearted support throughout the community at all levels." The good foundation shows. Maybe this is why the class of graduating sixth graders each spring chip in to buy a special gift for the outdoor program of their school, as a way of thanking everyone involved and making sure that the experience they've had will be available to future students at Lanesborough.

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- Lanesborough Elementary School has compiled a comprehensive "Lesson Guide for Use in Outdoor Education".

PROJECT OUTSIDE/INSIDE

SOMERVILLE

Open land in East Somerville is hard to find, and what there is tends to get paved over as soon as it becomes vacant. It is hardly an agricultural center, and not the first place you think of when gardens are mentioned.

But gardens will grow in East Somerville, and an innovative curriculum in development by the Somerville public schools is seeking to prove that more than vegetables can be produced in these plots. Pride of place, ethnic heritage, and community responsibility can grow in gardens too. One garden grew in the yard behind the East Somerville School, planted by sixth graders with help from their teacher and the staff of Somerville's Project Outside/Inside, which has sponsored gardens in or near several Somerville schoolyards. Anyone who's ever tried to turn hard packed city soil can appreciate the work those sixth graders did. They planned their garden, prepared it for seed, and planted in early April. From then on they tended, watered, weeded, watched, and waited. For probably the first time in their lives a small piece of the school had become their own, and they were proud and protective of this tiny patch of ground. One young girl's enthusiasm speaks for the whole class. After being given her curriculum/workbook for the garden experiment, Lizzie returned to her teacher the next day and said "I showed my mother the book and she loved it so much she's going to take up gardening again and help me make a garden in our backyard!"

The power of home grown food is remarkable. It can act as a force around which whole communities will unite. An indication of the energy generated by Project Outside/Inside's gardening program is the fact that parents and teachers seemed as excited by it all as the students, and when problems with schoolyards as garden sites began to occur some parents volunteered their own yards.

On Memorial Day weekend, a few weeks before school ended and about two months after the gardens were first begun, vandals got into the East Somerville School garden and destroyed the work of the young gardeners there. Though the vandalism was an emotional setback it provided, in some unexpected ways, an important lesson -- perhaps the most direct piece of education the kids would receive from their garden. Their teacher asked them open-ended questions in response to the destruction, trying to get students to verbalize their feelings about what had happened. The issues raised might not seem associated with gardening:

values, morals, citizenship. But they have every-
everything to do with education, particularly
environmental education. And they form the
heart of what Project Outside/Inside is working
toward with their broad-based curriculum devel-
opment and review efforts in the Somerville
schools.

The vandalism made concrete what had until then been an indirect lesson, that cooperation and respect are basic to a healthy individual and a healthy society. Nobody on the project staff would suggest destroying gardens as a part of the curriculum, but the responses of East Somerville sixth graders were heartening and enlightening, and they suggest that the deeper purposes behind the project's gardening program are being achieved: "I think if they have to do that they must have problems..." wrote one student, and another said, "They did it because they were jealous." But the predominant emotion was frustration, "The garden meant a lot to me. I planted and put up the fence, I dug, nailed the pole and the fence together and other things. I could have done more if nobody messed it. I think it was mean and horrible. It makes me feel very mad and very upset."

Project Outside/Inside has its own roots in the environmental movement of the early 1970's. It is an educational project with clear ties to the person-to-person community organizing that followed the initial spurt of Earth Day energy. Project Outside/Inside's director, John Madama, began his career in EE as a truck driver collecting waste computer paper for sale. Truck driving led to questions of how people could be encouraged to do more recycling, which suggested a community education plan. An Environmental Protection Agency grant supported the creation of a slide-tape presentation and the initial work on a recycling project for the city of Somerville. Pick-ups of glass and paper were regular but the city's residents didn't respond well to urgings that they separate their trash and recycle rather than waste. On the assumption that a well educated population will adopt changes more easily, Madama and others began to think in terms of a school centered recycling education project. A pilot curriculum K-12, called RECYCLE, was designed and implemented selectively in the schools. On the basis of its popularity, a Title IVC grant proposal was written. Project Outside/Inside was born.

This history is important because it shows the gentle growth of a movement into an educational program, and Project Outside/Inside is a bit different from a lot of other efforts within schools. Rather than concentrate on single classes or programs, the project is trying to instill an environmentally healthy

attitude in school curricula across the board, aiming for broad and subtle change rather than a few dramatic examples. Because Madama had worked with many teachers during the designing of the RECYCLE materials he had a good working understanding of what teachers really needed; because he was not actively teaching each day he was able to concentrate on the writing. Outside/Inside is convinced that the only way to infuse ecological attitudes into student education is to make the ideas fresh and personal, and immediately accessible. The project's dual focus is on community responsibility through recycling, and especially gardening; and on personal health maintenance and nutrition. Thus the title: Outside/Inside.

slide-tape presentations. Ask for a resource list from the project.

Curriculum materials are contemporary and active. Some take the form of mock newspapers or comic strips. All invite the participation of students in actual work. Students are expected, even forced, to become involved. The connection between gardening and nutrition and personal health is obvious, but changing long held habits and attitudes can be difficult. For city kids who have had no previous contact with growing things, a garden is a mysterious force. Tying their own health to the garden's is not that easy, but when a student has managed this trick further changing comes quickly.

The project staff suggest that changing the habits of teachers and parents is a job not mentioned in their mandate, but one which must be done concurrently with teaching students. Their hope is that the curriculum materials they have been writing will be broad enough to serve as an instigating force in other schools and communities, and since the project has been validated for dissemination next year the message of gardening and health will be shared more widely. And with a little luck and patience, gardens will continue to grow in Somerville too.

CONTACT

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-- Project Outside/Inside has available many curriculum resources including "Ladybugs and Lettuce Leaves", the student workbook on gardening and human/environment relations, high school texts in health and nutrition sciences, the RECYCLE series of teacher manuals, a guide to using school grounds for class activities, films and

PROJECT E.P.I.C.
WESTFIELD

Don Lambert is a veteran environmental educator. For the past dozen years he has directed Project E.P.I.C. (Educational Project to Implement Conservation), working to establish and carry out a solid environmental program for the Westfield public schools. Operating out of offices on the second floor of an old, and recycled, building in downtown Westfield, Lambert takes responsibility for everything from program and curriculum development to field teaching, logistics and organizing to teacher training. With a small and dedicated staff he's responsible for implementing environmental education in a diverse way throughout an entire school system.

Before he came to E.P.I.C. Don Lambert taught high school level vocational agriculture and biology classes. The solid and pragmatic base shows. "My voc-ag background has provided me with a certain emphasis on the practicality and diversity of science," he says, explaining his attempt to bring science into sharp focus for Westfield students through contact with the environment. E.P.I.C.'s job, simply put, is making this as easy as possible. Take science out of the realm of the imagined and put it into the world of the real. Doing this sometimes requires that pure science be integrated with other subjects, like social studies and health, or writing and reading. This is what E.P.I.C. does for Westfield teachers, designing programs and providing the physical and curriculum resources to back them up.

"It's absolutely essential." Lambert insists, "Having a resource center like this is the only way to inject environmental emphasis into the schools on a continuing basis. Even a single environmental coordinator would be much more useful than leaving it all up to the teachers, because it's not that teachers are unwilling to be involved, it's just that they don't have the time or energy to set up the organization needed to make a program run smoothly. That's what we can do, or at least what we try to do."

A resource center and coordinator may in fact be essential, and certainly useful, but they are far from common. Mostly teachers do end up with all the work, and the more adventuresome the teacher chooses to be, the more work there is. One of the critical obstacles can be frustratingly simple: A teacher may be sure of wanting to try something but lacking the background to pull it off technically.

This is the gap E.P.I.C. steps into. Established in 1967 with a Title III grant, the center began with a year's planning funds and three years of operating budget underwritten

by the funding. From the start local concerns predominated, Lambert explains, "We wanted to use the existing curriculum and local community resources as our base, not to provide an independent 'ecology' type program." In order to supplement and expand the existing base in Westfield E.P.I.C. began to develop some interesting, applicable materials, like a field trip guide covering all sorts of options within an hour of the town, from a visit to a local dairy farm to an exploration of the heavens at the Amherst College planetarium. The guide gives all relevant information on costs, requirements, necessary preparation, contacts and addresses. Most of the trips can be done with the E.P.I.C. staff. The point is to get information about outside activities into the hands of teachers in a useable and handy form.

Project E.P.I.C. developed a resource library of books and periodicals at their offices, open to anyone interested, and the staff offers a reference service to teachers, researching particular interest areas. This relaxes the burden on teachers, allowing them to concentrate on teaching and still keep current with what they teach. E.P.I.C. creates and organizes special field events, like a "Look Back Day" held at the Storowton Village Museum in West Springfield. On one school day every third grader in the school system participated in 1800's activities, dressed in period costume, making butter and preparing colonial meals, and working in the museum's craft shops. E.P.I.C. produced the event itself as well as the pre and post classroom work which was essential in making it a true learning experience.

The project's offices occupy several rooms, three of which are filled to the brim with equipment. Need an increment borer to help your kids study the age of a forest? Fish tanks and terrariums? Hip boots to wade through a swamp, or even a boat to go up the river? Westfield teachers can go to E.P.I.C. for all this and more. This makes inclusion of environmental and outdoor work much simpler for a busy teacher, and thus much more likely. Moreover, E.P.I.C. seeks out the least expensive replacement parts for equipment, often making their own to save money, preserving as much of the budget as possible for instruction.

One of the exciting things about the project is its breadth. From running a resource library to providing a one-week residential experience for every fifth grader at a nearby Boy Scout Camp, creating curriculum units and acting as a materials depot for hundreds of live chameleons that are part of the elementary science SCIS II kits used by Westfield schools,

E.P.I.C. is constantly touching base in many areas. In this way the project itself is a mirror of its credo to provide a multi-disciplinary environmental education base. "We try to use all the local resources," Lambert says. "Human and cultural and historical as well as natural. The environment is more than a nature trail, and we try to give students this wider view." In fact, one of E.P.I.C.'s goals is the exposure of young students to successful individuals in environmental fields. These role models are a solid reference, preventing environmental studies from seeming irrelevant and offering new options for student careers.

Because E.P.I.C. has been operating since 1967, suffering the fluctuating trends of funding interest, it is worth noting that the program survives because it provides a demonstrable service in the schools. Every year there is pressure to cut the budget. But every year parents and teachers line up to support E.P.I.C.

When Title III funding ended the project was picked up in the city budget, and has been locally funded ever since, but it had the good fortune to have been able to purchase most of its equipment, including the school busses E.P.I.C. uses to transport children on field trips, during the Title III period. To anyone connected with schools, E.P.I.C.'s busses will seem a real benefit, greatly alleviating the hassles of student transportation for field experiences.

Money continues to be a problem, restricting the project's expansion. Don Lambert wishes he were able to do more inservice teacher training, which he believes is an essential part of bringing environmental concepts into education. He wishes he could expand the field trip offerings, especially curriculum related things like "Look Back Day". But after twelve years struggling to keep his program healthy he has become something of a pragmatist, and he looks on E.P.I.C.'s work with seasoned pride. "Someone has to connect the schools and teachers to all the incredible resources available in our community," he says, "We do that, I think, and we will continue to do that in the future."

CONTACT

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-- E.P.I.C.'s resource library is open to the public, and the project has written many publications for the teacher seeking

to implement conservation or environmental education. These include field trip guides, plans for tying in-school work to E.P.I.C. trips, and descriptions of historically based field experiences and wild foods studies. These are Westfield and E.P.I.C. centered, but might be of use to other communities as examples.

N.E.E.D. COLLABORATIVE
CAPE COD

Snow last night has left a few white inches on Cape Cod's outer dunes. The storm continues into this morning off and on, spitting snow and swirling wind, cutting visibility to a few yards. A foghorn blows at regular intervals. The high dunes muffle the sound of breakers crashing nearby. A class of fifth graders is exploring the Cape Cod National Seashore on a February morning. After breakfast they spend an hour or two preparing for this hike, sitting in a big room at the old Coast Guard station which is their school and home for this week. On their way to the beach they spent an hour at the Province Lands Visitor Center, usually closed for the winter, where Ranger Warren Perry overcame laryngitis to explain the flora, fauna, and history of the outer Cape. Now the children straggle through the dunes, more or less in single file because they've been urged to avoid trampling the delicate vegetation that holds the sand in place. Every few feet the group pauses while their leader, N.E.E.D. Collaborative director Rich Delaney, explains something they are passing or asks a question.

"If you were alone out here," he asks, "Do you think you could find your way back to the Visitor Center?" A chorus of affirmative response. "How?" The students answer that they could follow their own tracks in the snow, neatly circumventing Delaney's attempt to make them closely examine their surroundings. He tries another tack, asking what the kids hear around them that might help in locating their position. Foghorn, wind in the dune grass and brush, ocean lapping the shore. Hands stretch impatiently into the air and soon voices take over, describing in detail the sounds heard when the talking stops. At a frozen bog Delaney invites students to try eating the cranberries still on the surface. A few do, and grimace, and Delaney warns "You'd better learn to enjoy them. That's your lunch for today!" His students are skeptical, but not certain he's kidding. Anything can happen during their week at N.E.E.D.

The N.E.E.D. Collaborative provides a one-week environmental experience based at a former Coast Guard station on Pamet Beach in Truro. Three Cape Cod school systems combined to form the collaborative: Falmouth, Dennis-Yarmouth, and Harwich. The cost of operating the program is divided among member school systems on a per student basis, and every fifth grader in the three districts spends a week at N.E.E.D. The collaborative is an attempt to guarantee that students will have well organized direct contact with their natural and social surroundings as a part of their regular education, encouraging them to take advantage of and be-

come more responsible for the protection of the natural resources on Cape Cod. Such a residential program would be a financial impossibility for a single school system, but the collaborative eases the burden by a cooperative arrangement. The attempt has worked well. Currently fully enrolled, and on occasion forced to run two classes at once, the collaborative handles the demands of only the three member systems. But Delaney hopes to expand, perhaps taking over the Race Point Coast Guard station, soon to be phased out of use by the Guard. "I'd like to see every kid on the Cape get a chance to come down here," he says. He is momentarily spared having to control the students; Ranger Perry has them captivated with a bucket of fish picked up at the Provincetown dragger docks this morning. The children were prepared for this, and stumble all over each other in eagerness to be the first to identify flounder, haddock, and cod.

"This is probably the high point of their elementary schooling," Delaney says. One fifth grade teacher who has since gone on to teach in higher grades claims that he gets students who went with him to Truro years back, and still talk about the experience. The collaborative is an offshoot of a National Park Service effort which provided sporadic visits for Cape students to the shore. When the three member districts decided that they wanted a more regular and established program, they formed the collaborative, but kept the original acronym (National Environmental Education Development) as part of the name. The collaborative is no longer directly tied to the Park Service, but does enjoy a great deal of support and cooperation from personnel like ranger Perry.

What makes N.E.E.D. so special is probably the degree of preparation that goes into it, and the duration of the residential experience. Well in advance of their visit to the station students are given a workbook/text written by Rich Delaney, which introduces them to what they will be doing when they arrive. The Seashore Book is a dynamic, involving and imaginatively designed soft cover notebook that includes games, puzzles, quizzes and information to take students right through their visit. Natural and social history are both covered in the book, as well as specific discussion of the local ecosystems and how to best study them. Before students ever go outdoors they're well acquainted with what to see and do there, and Delaney is convinced that this familiarity allows them to participate more fully in whatever they do.

Students come one class at a time to the station, which is used as a youth hostel during the summer months. They are accompanied by their classroom teachers, so there is a strong continuity with their regular schooling. The week is not quickly forgotten, and Delaney says students may learn more in a week than their parents know. Kids often return home to deliver lectures on the history of Cape Cod, or the names and functions of all the parts of a commercial fishing boat. Obviously a week is not time enough to do an in-depth study, but Delaney feels that N.E.E.D. serves its purpose in two ways: by sparking the interest of the students, and by keeping environmental education in the public eye.

Students who go on the N.E.E.D. trip are asked to contribute \$15 toward the expenses involved (food, transportation, maintenance, instruction, and materials, etc.) but nobody is ever turned away for lack of money. Total cost of operating the program comes to well below \$60 per student, per week. Contributing to this low budget is the fact that the Coast Guard station is available rent free in exchange for its upkeep, and the use of college teaching interns to supplement the staff. But the chief reason for the collaborative's financial feasibility is the idea of collaborating. Keeping the program running at capacity is a far more effective way of operating a residential center like this than trying to serve only one school or district. Not surprisingly, Rich Delaney is excited by the collaborative model, but not just for monetary reasons. What is important, he explains, is the example set. Cooperation among schools can make the best possible use of resources for all involved.

CONTACT

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- The Seashore Book is a very good and innovative workbook/text oriented toward the specific N.E.E.D. experience on the outer Cape, but could be applicable in many other marine environments, and useful as a model for creating similar texts.

UNIFIED SCIENCE CURRICULUM
DEERFIELD ACADEMY, DEERFIELD

In a crowded Nebraska courtroom on a sweltering summer day the president of a cloud seeding operation defends himself against charges in a suit brought by two groups of farmers. One group had contracted for the weather modification services, but now they claim that ineffective control of the process brought too much rain, hail, and thunderstorms, devastating their crops. The other group, from a nearby town, believes that the seeding drew rain away from their area, aggravating already severe drought conditions. In this uncomfortable spot the company president is attempting to justify the scientific basis for his work while freely admitting its imprecise nature. Both sides in the conflict have sought expert witnesses to testify on their behalf, and arguments are detailed and convincing.

Not an unusual scene in today's competitive and high investment agriculture, especially where environmental manipulation is concerned. Except that this scene does not take place in a courtroom at all. It is happening in a classroom at Deerfield Academy, and all the participants are high school freshmen. They have thoroughly researched and prepared for their roles in this eight day long simulation. Aside from the obvious excitement generated by the event (which often sounds more like a debating class than freshman science) students in the class are picking up at least two critical lessons in scientific reasoning. One is the value of extensive research, familiarizing oneself with the broad background as well as the specific detail. The second is the great variety of "true" answers to any question. They are discovering through all this in a very personal way some of the ramifications of human interaction with the environment.

Deerfield Academy is a private school in western Massachusetts, well known and generally considered traditional in style. But their science program seems anything but stodgy. The school has adopted the Unified Sciences Curriculum (U.S.C.) first developed by the Center for Unified Science Education at Capital University, in Ohio. U.S.C. differs from many other prepared curricula in that it specifies an approach rather than content. The intention of the Unified method is to demonstrate graphically the interconnection of scientific disciplines, and the relationship of sciences to daily life. Students are offered locally oriented and designed exercises as well as broader lessons. The resulting science curriculum is elliptical in form, touching down all over the place, often not in science at all but in the world of ethics or public policy.

Such is the case with the role play on weather modification, part of a meteorology segment that is the only first-year science course offered at Deerfield. Why meteorology? Teacher Chet Corkum explains that meteorology involves basic work in physics, chemistry, biology, geology and astronomy. This is opposed to plain biology, the usual freshman science requirement at most schools. But more importantly, the weather is a very tangible reality for students, something present in their lives at all times, not just in class. Because knowledge accumulated during the meteorology course can be applied for the rest of their lives, students seem to work harder to get it, developing lasting skills. Kids in the class man a weather station in the building and keep careful records. They learn to study clouds and make forecasts, and to interpret weather maps provided by the National Weather Service. This is very practical science, and it works well as an introduction to scientific method, which is what first year sciences ought to do.

A sophomore year class at Deerfield concentrates on the physical environment, exploring the Connecticut River Valley location of the school. After studying river geology and ecology they go out to walk along the river's banks, viewing these processes in action. They read about water pollution, then gather samples and return to the lab for analysis, determining the extent of pollution locally. This course uses role plays too, always in an attempt to build student confidence with self-directed work, and teach research skills by necessity. Being in an open forum, presenting evidence to support a case, encourages a student to do solid ground-work in a subject far more than a test will do.

There are no prepared texts for the Unified approach, simply because no texts exist which cover the range and substance of disciplines involved. Also, it is seen as critically important that experiments and examples reflect local conditions whenever possible. Deerfield teachers employ many different text materials, from Weather Service hand-outs to current newspaper articles, films and filmstrips and a variety of science texts which are kept on reserve in the science library. This diversity keeps students interested, and allows the teachers to focus attention on whatever they want, when they want to, without being tied to the pace of a textbook. Of course it also demands a lot from the teacher, but Chet Corkum insists that the rewards are worth the effort on his part.

The real emphasis in U.S.C. centers on experiment, observation, and research. It may be imploding a tin can in the lab to demonstrate the action of gasses under pressure, or taking

a weather station reading in the morning in order to make a prediction later in the day. Do things and you will discover. Students are expected to learn, rather than be told.

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- As a regional center for the Federation of Unified Science Curricula, Deerfield has prepared a variety of curriculum aids, lesson plans, and informational materials describing the Unified approach and its particular application at Deerfield. Teacher training is also occasionally offered.

THOMPSON ISLAND EDUCATION CENTER THOMPSON ISLAND

The truck crashes through an icy crust and jolts into a deep rut. Tim White, Island Manager for the Thompson Island Education Center, is showing me around the island on a bitter cold January day. A saltmarsh on our right trails off into a shallow inlet bounded with a sand beach. Driving over the beach we pass bare roots dangling from an abbreviated cliff. "Look at those trees still hanging on," White says, pointing, "That cliff got cut back by half during the blizzard last year." Three black ducks glide across the headland to join a large group resting in the water just offshore. A pheasant explodes from a hedgerow, flies a few clumsy yards and lands in an open field of stubble grass. A large windbreak on the bluff we are crossing now obscures the view but softens the cold breeze off the ocean. Less than a mile away through these tree branches, across shining seas, the towers of Boston's downtown skyline poke into the horizon.

Thompson Island is a bit like the complicated, skewed drawings in childrens' books: everything seems normal, but the caption asks, "What's wrong with this picture?" Though the island's 157 acres of salt marsh and open fields, clay cliffs, beaches and coves, orchards, and tide flats would seem most at home on the outer Cape or the coast of Maine, they exist just a ten minute boat ride from South Boston's Kelly's Landing. And in addition to the natural wonders (which genuinely are wonders for many Boston children) Thompson Island boasts outdoor and indoor ropes courses, playing fields, a gymnasium, dormitories, dining halls, and classroom space sufficient for 125 students. All this, and a staff of trained environmentalists and educators. The island houses an environmental education residential center which offers a number of services to school groups of all sorts, providing a real alternative for schools seeking an off-campus environmental experience but unsure of where to go.

The physical plant on the island is a legacy of Thompson Academy, a private preparatory school that closed its doors in 1975. The Thompson Island Education Center, successor to the Academy, retains the old school's Board of Trustees as well as its buildings and its belief that quality, environmentally based education is a right for all. The island has had a history of educational use since 1814, and in its current incarnation it sets out to provide a special and much needed service. The center offers urban students contact with the natural marine environment, and to those from outside the city it can

serve as a base for exploration of both urban and marine settings. The island has a unique blend of wild and urban environments, and for a class from a rural inland area this chance to experience the interaction of the two, as evidenced by Boston Harbor, can be tremendously exciting.

The center supports itself with a small endowment and revenues from the services it offers. There's an environmental lesson in this too, not lost on those at the island. Because the center must test itself against the realities of the marketplace, it is forced to constantly revise and improve its offerings, adapting and changing in response to the needs of the community it serves.

For the students from South Boston High School enrolled in the Center's Harbor Environments Program the boat ride to the island crosses more than salt water. H.E.P. members are recommended by the high school's guidance staff, and they come to the island for eight weeks. Their mornings are occupied with classroom study of environmental sciences, and the afternoons are spent on outdoor activities, counselling, and work projects.

H.E.P. students have built three nature trails on the island, planted and tended a garden, and done erosion control work on the beaches. But this work is not simply labor; it's tied in to the academic study so that gardening may follow plant sciences and precede nutrition. Students are tutored in core subjects they may miss while at the island, to assure that they don't fall behind in school.

But probably more valuable than the academics for these youngsters is the different attitude of the Center staff. Teachers on the island become friends, not enemies. Working on a high ropes course forces students who wouldn't normally associate with each other to cooperate and be mutually supportive. And exploring the complex interdependence of natural environments helps make visible the similar skeleton of their own human communities. One Thompson instructor remembers two teenage girls who arrived at the island for the H.E.P. course stubborn and balking. "They were the worst troublemakers," she says now, "always refusing to do anything and trying to get out of working. They slowly began to change, but we continued to have trouble with them. Then an amazing thing happened. They had finished their course, and returned to the island for a single day program months later, and they were real leaders! First off the boat, showing their friends around, acting as if it were their island! The change really showed, and it made us feel good about what we're doing."

"Algebra on an island isn't any different

from algebra anywhere else," says center director Frank White, "So why do kids learn it out here and not at school? Because the atmosphere and environment are different." South Boston high students have even tried to preserve some of the spirit of the island by forming a support group back at school. This speaks well of the Thompson approach, one which evolves to suit the needs of each student. What is best for kids from South Boston may fall flat for students from the Berkshires, so the center's staff concentrates on flexibility and personal attention. They work regularly with ages from primary grades through adults.

What is best about the place is the opportunity it offers to both participate and observe. Though the island's natural beauty is striking, the staff point out that environmental education is more involved with attitudes than landscapes. If students learn to cooperate, and learn to recognize the cooperation essential in nature, perhaps they'll recognize that cooperation is important to any community, especially urban centers like the city of Boston, across the harbor.

But one young fellow, a member of a fourth grade class taking part in the island's T.I.D.E.S. (Thompson Island Design for Environmental Studies) program for elementary grades, had some trouble even locating Boston, much less understanding it. T.I.D.E.S. coordinator Mary Troy tells the story of William, an Hispanic boy. One sunny afternoon on a field below the center she asked him what he saw as he looked across the water to the city. The child waited a long moment in deliberation, then brightened up as he came to the answer. He turned to the teacher proudly and announced, "Puerto Rico!"

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-- The Center has a number of standard single day and residential offerings, and can custom design a plan for any group.

PROJECT O.P.U.S.
TURNERS FALLS

The back of the truck is filled with cabbages. A truck smelling of wet cabbages is not the most likely place to find a high school teacher and administrator, but John Lepore, the young man driving the truck out into an open field behind Turners Falls High School, is not your average high school teacher. Lepore, as director of Project O.P.U.S. (Occupational Program in a Universal Setting), is teacher and advisor to a group of high school students who are blending their traditional education with practical study of agriculture and horticulture. Neither vocational agriculture nor pure high school academics, O.P.U.S. is an interesting blend of both.

The project operates a big market garden, student managed and tended, which has produced a lot of flowers and vegetables in the past year. The garden is an important segment of O.P.U.S., but the focus is to provide practical applications to classroom theoretical concepts. For example, a Spanish class studying the Mexican culture may grow, cultivate, and harvest flint corn, then grind it into flour and make tacos from it.

Handling themselves efficiently and competently as business persons is part of what students in O.P.U.S. learn, and it is important. These kids are not just planting cabbages, they are studying plant sciences and product markets in addition to practical agriculture. This mix gives the project its character, and Lepore says he's not looking for the student who could be at agricultural school, "Mostly we try not to duplicate what Franklin County Technical School is doing. However, we try to cover many topics related to agriculture and help students find jobs and further schooling in agriculture."

Turners Falls students may enroll in O.P.U.S. as an elective in high school. One full class period each day is spent in the program, and usually more time is involved, taking up some of the students' after school and free time. One class period a week is used for lectures and discussion, on anything from crop rotation and garden management to using a telephone well. The other four periods are used for actual work. The project has a small greenhouse attached to the school. Seedlings are prepared for the garden here, and during the winter, house plants are raised for sale. Class members take on special projects in the garden or greenhouse, under the supervision of the O.P.U.S. staff. The projects may be work centered, or more academic, like a study of plant propagation or fertilizers. All students must share

responsibility for the smooth operation of the program, and some of them may become paid student managers during the summer when O.P.U.S. joins forces with the Neighborhood Youth Corps to provide employment opportunities. The chance for a job is an incentive to work hard during the school year, and some managers may continue to work part-time. If they effectively carry out self-initiated projects they can receive an extra five credits for the year.

The formal curriculum for O.P.U.S. is loosely structured. The classroom that serves as the project's base is full of odds and ends and stacked with materials: Department of Agriculture flyers, back issues of Organic Gardening magazine, Cooperative Extension Service bulletins, cardboard boxes filled with flower bulbs and ornamental gourds. On this morning, two student managers are cleaning pumpkins for sale later in the week. The room appears to be well used, not sloppy but active. The big garden has just been turned over for the winter with only a few vagrant plants poking out of the clean surface, but Lepore takes me out to show me his small orchard, blueberry patch, and stem flower bed. When O.P.U.S. funding from Title IVC ends Lepore is convinced that the project can be largely self-sustaining, at least in terms of materials. He expects to sell enough produce around the community to pay for the seeds, tools, and fertilizers required to keep up the work.

Lepore is also anxious to integrate the O.P.U.S. experience into the whole school, so the project is not seen as an isolated, narrow effort. Toward this end he has hired a curriculum specialist to help teachers develop ways of bringing traditional academic disciplines into the garden. He urges his student managers to undertake independent projects in which they work as peer teachers with younger students and act as assistants for teachers bringing classes to explore O.P.U.S.

Probably the most important thing O.P.U.S. students learn is the value of self-discipline and motivation. They conceive and execute tasks covering different disciplines, grounding themselves in real work. "A garden grows more than vegetables," Lepore says. "it creates self-respect." On a rainy afternoon as we stand in the center of a barren corn patch talking of plans for next year's garden, the school track team comes over a rise in bright red uniforms and trots around the garden. "I guess they're using O.P.U.S. for something," Lepore grins, "but I'd like to get them more involved."

He likely will. A big sign on the road outside the school, left from the summer farm stand, says: "O.P.U.S., A Project That Belongs to the Students of Turners Falls High School,

Something to be Proud Of!"

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THE ENVIRONMENTAL CONTROL COMMITTEE
B.M.C. DURFEE HIGH SCHOOL, FALL RIVER

A stack of impressive, official looking documents a foot tall is a testament to the ten year existence of B.M.C. Durfee High School's Environmental Control Committee. Each report is a thorough investigation of some subject of environmental concern to residents of Fall River, where the school is located. Many of the studies concentrate on water issues, since the city is laced with ponds, rivers, and streams. These reports provide resource inventories for local recreational lands, maps, field research results on stream pollution by industry, and statistics on pond pollution by vacation cabins, and they offer suggestions on what might be done to correct the problems. The work is professional, competent, and valuable as attested to by letters of appreciation included as an appendix in each report. And by the fact that the committee received a Presidential Citation last year from President Carter.

Judging by the quality of the work, these students must have spent considerable time investigating techniques of environmental science, not to mention the implications of environmental politics, especially with regard to the economic conditions in their city. Since Durfee High offers a course called "Ecology and Environmental Control" taught by the committee's advisor, Roger DuBois, I assumed that the students who developed the reports were products of the curriculum.

"Well not exactly," admits Janice Yee, a senior and current president of the committee, "You see, we can't really take the course, because we're mostly college preparatory students and our schedules are already filled by required sciences." So the committee meets during free periods, after school and on weekends and vacations. With the help (and not much of it, he insists) of Mr. DuBois, the committed group selects an area for each year's focus and devises an action plan. With no academic credit, no teacher hovering over them to make sure the work is completed, no outside pressure whatsoever, the members of the Environmental Control Committee carry out ambitious research projects. Why? "Well, once you get interested in these things, you sort of feel a responsibility to stay involved with them, and you want to see the projects get done," is one member's response. Last year their investigations were persuasive enough to convince a fair percentage of cottage owners around a pond threatened by sewage pollution to upgrade or replace their waste treatment systems.

In other years the committee has monitored the city incinerator's compliance with air quality standards, and analyzed industrial

pollution along one of the city's central waterways. The latter led the students to call in officials of the Environmental Protection Agency for an investigation. The agents claimed to have found no evidence of pollution severe enough to warrant any punitive action. The students weren't so sure. They had done their work well, and remained convinced that their data was accurate. So they went back to the river and did the entire study over again, checking samples and figures for the second or third time. They emerged from this with even more definite proof, and called the E.P.A. another time, offering the exact location and time of day of the illegal discharge. The mill installed anti-pollution devices and the students went home satisfied, with commendations from the state, city, and school.

What we have here is a case of environmental self-education, carried on by students out of a determination on their part to pursue exciting and relevant studies. Advisor DuBois, justifiably proud of these kids, suggests that in many cases the most worthwhile environmental education experiences may rise out of just this sort of self-starting activity. In previous years the committee was given a boost, and some added membership, by a special summer program offered to Durfee students in which they could earn extra science credits by joining a summer environmental sciences project. Lack of funds has terminated the summer program, and the committee is faced with the awesome task of gathering all the needed data without that extra lead time. Does this slow them down? Not a bit. In fact they seem more committed than ever, and they are recruiting new committee members from the "Ecology and Environmental Control" course.

Committee members usually sign up as freshmen or sophomores and stay through their entire high school career. They have acted as advisors to drop-outs, trying to re-interest them in school by getting them involved with hands-on environmental work. It takes a special sort of kid to stand up to a peer a few years older, and risk the stigma of being considered too "academic". The encounters were valuable, and one student seemed to speak for them all when he said "It was scary sometimes and difficult all the time, but we learned a lot."

Students who join the committee or take the "Ecology and Environmental Control" class become adept at field sampling techniques, using Hatch, Lamotte, and Millipore testing kits and learning standard lab procedures that could be useful to them in seeking jobs later on. But they learn something less obvious too: a healthy respect for the inherent balances in ecosystems and social systems. Because they must seek

out information where they can find it, they come into frequent and occasionally frustrating contact with state, local, and federal agencies. They begin to see the difference between individuals within organizations and the agencies themselves. This constitutes an education in some of the realities of the modern political and governmental process. Coupled with an ability to work in a group while accepting personal responsibility, it ought to prove most valuable to these students.

This year the committee is poking around yet another stream, checking up on pollution there which might be changing the purity of some recreational ponds downstream. They run into time and sampling problems, including at least one cold dip in the river, but now they're working overtime to get the bugs out of their testing system. And when they do, watch out!

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PROJECT AQUA
WEST BOYLSTON

Cyrus Knight feels pretty good. The lamentable death of his mother has nearly doubled his wealth, and raised his rank on the town tax rolls from twelfth to third. Knight is a lawyer, his wife's name is Polly, and in 1845 he was the father of two children, the owner of a little livestock and no land at all. His mother's estate left him 105 acres of pasture land, forty-five acres of woodlot, nine horses, five swine, three oxen, two cows, a two-seater wagon, and a big jump in social status.

Edward Rivers on the other hand is not at all happy with events in his life lately. A young wagon builder working toward solid middle class respectability, Edward was the unfortunate victim of a fire over the winter. He lost his shop and home, and was forced to sell his only cow in order to survive. He watched his rank in the community plummet along with his economic fortunes.

And what of Adrich Seward, the quiet, self-possessed farmer? Adrich worked long on his acreage, slowly converting wooded land to tillable soil, and while his income was negligible and his personal wealth limited, he was isolated from the fluctuations of the economy and kept a stable position on the tax rolls.

We know all this because a computer told us. Knight, Seward, and Rivers are the alter egos of sixth graders in West Boylston. Project AQUA gives each participant a new identity. Material handed out to each student in the class is reminiscent of a television spy show, including all the pertinent information for their new characters: occupation, marital status, family size, income, savings, and rank in the community. Knight, Seward, and Rivers all live in a fictitious town, Waterbridge, during the mid-1800's and they come alive in the classrooms of West Boylston.

Their present incarnations as middle school students are unique in ways other than the fact that they've "come back from the grave." We know so much about their fortunes because these men, along with other residents of nineteenth century Waterbridge, have been programmed into the memory of a Wang PCS-II portable computer. The programs have been designed so that when changing social and environmental conditions are entered into the computer, the character's readouts will change in response. So the students, who would normally have a hard time comprehending the effects of time and environmental manipulation on their lives, much less on the larger community, now have the unsettling experience of watching themselves, on paper, rise and fall as their fortunes fluctuate. History takes on a quite personal tone for young students who dis-

cover the inequity of fate as they see their friends inherit great wealth while they struggle with the aftermath of a fire.

The premise behind Project AQUA is that the computer simulation will help students to understand the long term effects of a political solution to environmental problems within a community in human terms without becoming consumed with memorizing facts and figures. West Boylston was an agrarian, pre-industrial town that underwent major changes when mills were built along the Nashua River. But those changes seemed small in comparison to what happened in 1895 when the Wachusett Reservoir was constructed, flooding six square miles of the town. With the passage of time what was at first regarded as a terrible loss came to be viewed as a great resource, when recreational opportunities offered by the reservoir became more valuable as the community was increasingly composed of workers no longer dependent on the land for a living.

This sort of history is shared by many Massachusetts towns, an ideal focus for a study of change and evolution made vibrant by its immediacy. But students may have problems with such a study: it can be very difficult for children in middle schools to collect, manage, and recall at will all the facts and figures involved in a study of this type. What tends to happen, according to Project AQUA's instigator and director Curtis Simpson, is that students end up devoting all their efforts to doing the busy work and miss the point of the lesson. Simpson wondered if there were some way to ease the information processing burden, thus allowing children to better assimilate the more valuable social and environmental learning.

Simpson's solution was the computer. The first step was the assembly of a data base upon which to build the computer models. Data was obtained from various sources, including the vital statistics of the Commonwealth of Massachusetts, old maps, and accounts of the period. The resulting composite, entirely fictional, became the primary data base for computer manipulation. For Curtis Simpson the development of the project has been a learning experience. He has learned computer science himself, and has discovered that he enjoys using the machine. His initial naivete proved to be a blessing in disguise--the materials developed are designed for instructors with a minimum of experience in computer operation. A high school science teacher and one especially talented high school senior have been very helpful in setting up his programs.

As the computer-managed simulation progresses, Project AQUA's students are afforded the opportunity to try increasingly complex models. What will happen to the community if a slaughterhouse is built along the river? How will that affect the farmer, the lawyer, and the

wagon maker? Whose interests will be best served, and whose ignored? The nicest aspect of the computer simulation is that the ever present "What could happen if?" is answered for West Boylston students in a matter of moments, when the machine spits out information. When students make their cases and argue their positions in a role play, they will know the results of their actions while the arguments are still ringing in their ears.

Simpson believes that an introduction to participatory democracy coupled with an overview of the town's current condition will give even younger students an understanding of the necessity for participatory democracy in solving larger environmental issues. As an added benefit they become comfortable with computer basics. For some the use of computers may seem incompatible with an environmental project, but Simpson insists that environmental education is more than the study of the birds, bees, and flowers. Project AQUA allows middle school students the chance to manipulate the political process in an attempt to solve environmental problems--thus leading to the development of citizens who will be environmentally responsible and politically aware.

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-- A Classroom Manual, including lesson plans and computer magnetic diskettes, is available.

QUABBIN REGIONAL HIGH SCHOOL

The owl is almost invisible, its plumage so well matched to the mottled browns around it that even from just a few yards away students whisper "Is that it? Over there, under those branches?" The bird must be wounded, or it wouldn't allow us to come this close. The students are eager and curious but they keep a respectful distance, careful not to further upset it. The bird is a Great Horned Owl, biggest of New England's native owls, and it is staring out from the protection of a hawthorne thicket about five hundred yards behind Quabbin Regional High School, in Barre.

The students, staring back at the owl, are members of a class called "Conservation", a full credit science option for juniors and seniors. On this fall morning the class has been planting black walnut seedlings. Quabbin High is a registered tree farm, and students from the "Conservation" class do much of the work: class periods each week are spent outdoors, weeding and clearing, pruning apple trees or tending the Christmas tree crop. These young black walnuts were raised from seed by the class. Combining an active work program with lab and classroom study provides a well rounded conservation education.

We pause to observe the owl on our way back from planting. Owls do not drop in every morning, but teacher Bill Gauld tries to keep his students prepared for the unexpected. "You've really got to take initiative if you're going to get ahead," he lectured earlier in the day, and when the wounded raptor was reported on school grounds he hustled the class out to take advantage of the opportunity, a rare one, of seeing the owl close up. One of the nicest aspects of environmental sciences, Gauld says, is its unpredictability. Students are dealing with scientific method, chance, and real life. This morning Gauld told them he expected the survival rate for the trees they were planting to be quite high. "But," he added with a grin, "the rabbits might eat them all too."

Quabbin Regional High School is a relatively new school located near the huge Quabbin Reservoir in west central Massachusetts. The school has taken the unusual step of requiring that students complete at least two and a half credits in environmental sciences before graduation. In addition, Quabbin students are tested for competency in a range of disciplines, including environmental sciences, to assure that they have achieved minimum standards. Competency testing and minimum requirements have received much notice lately, but they've hardly ever been applied to the environmental arena. In fact, the study of science has been downplayed in many schools

in deference to expanded basic skills programs. Gauld calls Quabbin's approach "testing for basic survival skills for living in this world." Competency can be developed, and credits earned in several course offerings: "Conservation", "Man and the Environment", "Topics in Environmental Sciences", and "Field Biology and Ecology". The courses are directed at the entire school population, but a special effort is made to adapt to the special needs of two quite different groups: slow learners and exceptionally bright students. Environmental education, as an approach, is well suited to these dual jobs, offering a level of challenge that can be easily geared to differing individual abilities without restructuring entire courses.

In "Field Biology and Ecology" for instance, Quabbin seniors who elect to take the course divide into research teams. Each team delves into the environmental character of three different ecosystems near the school. They learn the frustrations and methods of field research while they are learning how to function well as independent yet interdependent members of a working group. When they have finished sampling for the fall, each individual student must write a research paper evaluating the scientific worth of the project and their own learning experience during it. These young people are learning more than science skills, though Bill Gauld claims that the hands-on quality of the environmental work has excited kids who would not otherwise be interested in sciences. They are finding out things about the fragile relationships between people and land. Studying their test plots behind the school, Quabbin students understand that they are working in a drainage area, and that water from this slope will eventually fill Barre's reservoir. They are less likely to pollute when they will be drinking the results.

Some of Quabbin's environmental studies options are vertically integrated, bringing students of differing grade levels into working contact with one another. Teachers from other disciplines, like art, history, and English, will often do complementary projects which help students to understand the role environment plays in our whole culture. Teachers in the program work hard, pushing themselves and their students to do the best possible job. "I trust the students with a lot of freedom," says Gauld, as the research teams filter into the woods, "and that trust is rarely abused."

Gauld is a strong supporter of the environmental science requirements at Quabbin and has devoted long volunteer hours to preparing teaching materials for the program. "I don't think environmental studies get the

treatment they deserve at most schools." he says, "Often they're seen as special, isolated activities. Here we see them as basic education, and essential." Gauld will admit to wishing he had more time to develop and refine curriculum materials. And he has trouble squeezing field work into class periods. "Running a tree nursery in forty-five minute periods is impossible," he says a little wistfully, "You just can't do it. But you do do it." He wonders how to properly test and evaluate the growth of the environmental consciousness he is trying to instill in the students at Quabbin. All he can do is try, and he says it's worth the effort.

Watching his class operate smoothly in the woods makes the reasons for his willingness clear. He is a teacher with a special situation in this beautiful rural campus and he has made the most of it, forming links with conservation agencies and extension agents to provide his students with a taste of real work experience in the woods, while offering a distinct community service to surrounding towns.

Not all teachers and schools will have these opportunities, but the example set by Quabbin Regional and Bill Gauld is a good one, taking environmental education seriously as a matter of course, and being ready to put in the work essential to making it happen.

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- Course outlines and curriculum guides for Quabbin's environmental studies courses are available, and an outline of the school's environmental science competency testing should be ready soon.

MUSEUM OF NATURAL HISTORY
CAPE COD

If you cannot get the children to the museum then bring the museum to the children! This was essentially the attitude adopted in 1970 by the Cape Cod Museum of Natural History in Brewster, when that organization proposed to several schools on the Cape that a course of study in natural history and environmental sciences might be offered in the primary grades. The museum was incorporated in 1954 and their obvious connection with the Cape's natural resources suggested that it might be in the position to best design some formal plan of instruction, which the schools could then employ. Determining that this would indeed be valuable, and aided by a small grant from a local foundation, the museum went ahead with the development of a pilot effort that has since evolved into a twenty-four week unit of nature studies. Schools subscribing to the program number twelve, with approximately fifty class sections involved. The participating schools pay a minimal fee for instructional time, while the museum picks up the bulk of the costs.

The Environmental Science Program consists of a weekly visit to each class by a teaching naturalist from the museum's staff. Each week the instructor covers a distinct topic, general or specific: Reptiles and Amphibians; Trees of Cape Cod; Pond Life in the Fall; Marine Mammals; Fishes of Cape Cod; Trees in Winter; Planets and Stars; and Wings, Feathers, Feet and Beaks are representative titles. "What we're trying to do," explains instructor and museum director Donald Schall, "is inspire an interest in and respect for the natural environment." The program emphasizes contact with the outdoors whenever possible. Classes search the school grounds for animal tracks, moths and butterflies, interesting plants or trees. Students are taught basic identifying techniques, something instructors hope they'll take with them when they leave school, helping them to become more comfortable in the landscape. Field trips to the woods, the beach and salt marsh, as well as to the museum itself with its collections of artifacts and living creatures, complement the classroom work.

More than one aspect of this program seems exemplary. First, and likely most powerful for the students served, is the regular appearance of the museum's naturalists in the schools. This gives kids more than an academic experience of natural history, it is a chance to contact a person whose life is based on active work in this field. Few youngsters can imagine easily where an interest in nature might lead, and getting to know the museum naturalists can be as much of an educational opportunity as the subject matter itself.

As part of the process, students involved learn about what a museum is and how a museum staff operates, if only on some subconscious level. This is important. Educational director Bob Prescott says "Some kids get really excited just by working with a scientist. They haven't had any contact with working scientists before and in school they can get to feeling like they're oddballs, so being able to work with us is a real reassurance for them." Prescott directs a group of high school and junior high students on volunteer research projects at the museum. Many of these same students first learned of the museum by taking part in the Environmental Science Program while in grade school.

A second, equally compelling example set by this effort is that of an independent cultural institution actively involving itself with the schools of its community. While most museums, research facilities, and libraries will make themselves available to school groups on some level, few actually seek out the connection as the Cape Cod Museum of Natural History has. Don Schall explains the museum's rationale. "It's good for the museum. Winter is a slow time for us here; our attendance jumps way up for the summer months. We see our work in the schools as building an audience that will support the museum. When those kids go home after a class with us, we're the topic of conversation at supper. Their parents may not even know about the museum, but the kids do and they spread the word. Parents will take out family memberships because their children want to attend museum events and take part in museum activities, and then the parents will begin to come themselves. And it's good for us as teachers too; it keeps us in front of the kids, so we know how kids think. That makes our museum based classes better." There is no question that the in-school program costs the museum money, but the Board of Directors and the staff both believe that benefits far outweigh the cost.

Schall insists that the institution's interaction with the schools is mutually beneficial, easily arranged, and an asset to the community which could be duplicated elsewhere. He simply points out that reasonable limits ought to be set and observed. "Any other museum could do what we do, and it doesn't have to be a natural history museum..." Schall points out that a small community-based historic museum could provide exciting access to the cultural evolution of a place, which is surely a part of any environmental education.

Programs for next year are being redesigned to meet changing needs. But Schall is quick to assure that this does not signal any slackening of the museum's commitment to education, just an

attempt to find better ways of expressing it. He says the work with older students will expand, and he is working with school librarians to develop resource collections in the natural sciences that will be made available for student use. In addition, the museum is putting together natural science kits to be offered to teachers.

The school museum connection demonstrated by the Cape Cod Museum of Natural History would seem to have clear benefits to all.

CONTACT

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Robert Prescott, Educational Director
Cape Cod Museum of Natural History
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-- The museum's teaching naturalists have created several teacher guides to the natural sciences. The museum publishes a newsletter and a quarterly magazine, The Cape Naturalist.

THE ENVIRONMENTAL CENTER OF SPRINGFIELD

The Environmental Center of Springfield (E.C.O.S.) is housed in a big old barn-like building beside Porter Lake in the city's huge Forest Park. In winter the building is used as a warming shack for skaters on the lake. The main room is filled with displays: fish tanks and terrariums, dioramas, notice boards, and posters. They do not seem to attract much attention from the young skaters who pass in and out. This is probably due to the fact that if any of them have been through elementary school in Springfield during the last eight years they've already been well introduced to E.C.O.S.

Nearly eight thousand students a year take part in Springfield's Project E.C.O.S. Every 4th, 5th and 6th grader spends three days each school year at the center, which has a fully certified teaching staff of ten environmental instructors. The idea of E.C.O.S. is two pronged, as director Cliff Phaneuf explained recently. Primary in importance is giving Springfield kids a chance to become familiar with the outdoors and developing greater self-confidence in pursuing scientific study. The other key focus of the project is exposing students to Forest Park, a 750 acre public park located only a few minutes from downtown Springfield. Phaneuf hopes that kids who have participated in E.C.O.S. will have a sense of personal responsibility for this remarkable resource, eventually cutting the rate of vandalism there.

Project E.C.O.S. began when Springfield science supervisor Lorraine Ide designed a one-year pilot program in 1968, which ran with school funding. The success of this effort led to a Title III grant application by the city, and in 1970 the project was fully funded by this federal grant. The fact that it had already been operating successfully for a year meant that very little effort had to go into planning during that first funded year. The project was able to turn its full attention toward operation. Providing an experience for eight thousand students demands considerable attention! Of course not every community will have a chance to float a trial balloon like this, but the extra stability offered by this operating base seems to have really served E.C.O.S. well. Still, "I used to go out three nights a week," remembers Phaneuf, "I'd speak to any group, just trying to build support for the program." The necessity of building a strong local commitment even when the program has outside funding is too often ignored. Phaneuf realized that his Title III grant would expire eventually, and that then the project would have to operate with city

funds, so he set about making sure he got them.

For a student, much of the E.C.O.S. experience consists of being outdoors. The fourth grade concentrates on the interrelationship and interdependence of all things, exploring pond ecologies and the woods adjacent to the project office. Then in fifth grade, building on what they've already learned, they study adaptation, succession, and climax communities in forests. By grade six they are exposed to their own relationship to the outdoors in a very personal way, with units on awareness and survival skills, and some rudimentary orienteering games. This has turned out to have unexpected benefits. Phaneuf tells a story of three E.C.O.S. graduates who went hiking together when one fell and badly broke his leg. Drawing on what they learned at E.C.O.S. months earlier, his two friends splinted the break and carried the injured boy out, which his doctor allows may have saved the leg.

Student commitment to the program is high. Maybe too high. Phaneuf chuckles, recalling one child who was quite sick and faked good health in order to be allowed to go to school for the day, so that he could come to E.C.O.S. This excitement does not go unnoticed by parents and teachers, which Phaneuf points to as part of the strong foundation of financial and administrative support from the school department for E.C.O.S. "Teachers are always saying their kids are different when they're here," Phaneuf says. He actively encourages parents to participate with an invitation included on the information sheet mailed them before their children visit the project: "Give in to your own sense of adventure." it says. "Get into some old clothes, dress for the weather, pack a lunch and tell your child's teacher you'd like to accompany the class to E.C.O.S. for the day or the entire session! We look forward to having you join us!" Phaneuf is proud to note that nearly five hundred parents a year take him up on this offer, some coming back again and again. One even became a volunteer aide after her children had finished school.

The struggle to survive financially has added a special spirit to E.C.O.S. even if no one on the staff would want to have to hustle all the time. In trying to reduce the costs Phaneuf has learned to forage well. Asked if the program was financially comfortable he replied, "Comfortable? You're never comfortable. We scrounge a lot. There are some things you can't scrounge, but not many..." For pond studies he makes his own dip nets, at a cost of about fifty cents instead of six dollars from a supply house. The staff does its own janitorial work, and "borrows" their

building from the city's Parks Department. And everything gets recycled.

All too few federally funded environmental education projects last very long after their funding ends, and E.C.O.S. is a welcome exception. Phaneuf attributes the project's longevity to its broad base of support. Every student, including those with special needs, gets a chance to go through the program at Forest Park. A group that arrived in wheelchairs had no trouble; they measured out an acre by wheeling around the boundaries. "If they can make it in school they can make it here," Phaneuf says, and he knows. He taught handicapped classes before coming to E.C.O.S. He is proud of the project, and says happily that "Some of our sixth graders can give politicians a good argument on why to preserve parkland." That sort of thing gets noticed.

And supported. "Because we'd invited parents to participate in E.C.O.S., when the budget crunch came one year and the program was threatened we got eight hundred people out to a meeting to support us. I think that's essential," Phaneuf says, and he suggests that another way E.C.O.S. has solidified its position is by working well with school administrators and principals. "You've got to get administrative backing. If you don't have the principals you'll get nowhere. If they're behind you, you're a big step along the way. Bring them in early on the planning. And bring in the community too. Let them participate."

CONTACT

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- E.C.O.S. has a complete text and curriculum for the three grade levels it serves, as well as extensive resource collections.

PROJECT ADVENTURE HAMILTON

Bob Lentz is tall and casual-looking. He does not go in much for formalities, offices and the like, and just now he is sitting on a kitchen counter talking about adventure, and Adventure. Lentz is director of a curriculum and program development effort called Project Adventure, run out of a recycled old girls' summer camp in Hamilton. Many of the environmental education projects included in this book owe a debt to Project Adventure, using components designed by P.A. or at least modelled after them. The P.A. staff has helped countless schools to create their own environmental or experiential education programs, and in the eight years since it began in 1971, P.A. has seen its philosophy of experientially-based education evolve from being treated with a suspicion bordering on hostility to being lauded as vital to innovative schooling. The project is largely self-supporting through revenues from the sale of its publications and consulting services, and teacher training workshops that have drawn audiences from across the country. P.A.'s answer to the question "What do you do when your grant runs out?" was to enter the marketplace. They've thrived there. While administrators everywhere worry about shrinking budgets and declining enrollment, Project Adventure seems to have found the right combination for success.

What does Bob Lentz say about all that? "Well, there's a good deal of luck involved in being in the right place at the right time." He's not downplaying the worth of the project or his pride in what it has accomplished, but he has a commitment to honest appraisal. He ought to. It forms the center of the Project Adventure method.

Before coming to Hamilton, Lentz directed educational programs for Outward Bound, which ought not to surprise anyone who knows much about P.A. The project began as an attempt to integrate the excitement and challenge of O.B. with the normal routine of a student at Hamilton-Wenham High School. The school's principal and its curriculum coordinator were excited by the possibilities of Outward Bound as a direct educational program, incorporated into the academics and physical education of their school. They applied for and won a Title III grant to "develop and implement pilot programs...to write sample curriculum units, and to collect evaluative data." In addition the proposal envisioned the project becoming a regional resource to local school systems. That is taken from a brief history included in P.A.'s excellent handbook, Teaching Through Adventure: A Practical Approach.

At first P.A. was wholly contained within the Hamilton-Wenham school district, but Lentz says that at no time did the project or the school's administration expect that sort of relationship to continue. He suggests that it might be a worthwhile exercise for those applying for grants to wonder what will happen when the grant runs out, if they get it. If the program is worth sustaining, and fighting for, then perhaps it isn't worth doing in the first place. Though P.A. is still administratively contained by the district, it is financially solvent on its own, accepting about 7% of its budget from Hamilton-Wenham. That is just about how much of their time is devoted to the local school too. Project Adventure is a part of the National Diffusion Network - a United States Office of Education Program that disseminates model programs on a national basis. Through the network, Project Adventure works regularly with teachers and school systems from Oregon to Georgia. Of course not every project will want to peddle its own wares away from the school it is based in, but the option is worth considering.

Project Adventure hit a streak of luck, as Lentz freely admits, because their earliest work with physical education caught on fast. The basic idea to this effort was that physical education can be used for more than just exercise, and that conventional athletics seemed to foster competition to the detriment of self-confidence and cooperation. The project devised "non-games" in which the goal was sharing rather than winning, and they introduced the ideas of outdoor education, especially the "Ropes Course", to a wide audience. The "Ropes Course" is a maze of lines, platforms, and swings built into trees or attached to the walls of a gymnasium, resembling a huge loosely-knit jungle gym. Students on the course execute problems that force them to confront physical challenge and personal fear, cooperating to get over obstacles, all of which equalizes most groups and helps to bring loners in. Breaking down the artificial boundaries and social barriers between students is a more important part of a ropes adventure than learning to scramble over a web of line.

"The phys. ed. component gives phys. ed. teachers a real option to running laps in a gym, and makes them feel like teachers for once," Lentz says. "And it's an effective way of dealing with high school kids. It gives them a chance to be physical, to overcome some fears, to learn and grow and feel a bit of delight." But Bob Lentz is adamant in saying that the project's real goals extend beyond innovative gym classes. The Adventure touch on an English course produced a creative writing unit in which students were taken rock climbing and asked to write about the

experience. A biology class mucks through a swamp. A social studies class gets lost in a big city. Project Adventure believes that students learn better when the thing being studied is about six inches in front of their noses, not written in a book. P.A. does not mean to imply that all conventional education can be done this way, only to urge that the option be considered. If traditional methods do not seem to be accomplishing their job, try something else. "Society says that the more you sit at a desk with a paper and a book, the more you're learning," Lentz says, "We're not trying to disprove that. We're trying to provide evidence of an alternative view."

P.A. is working now in the development of effective evaluation materials for experiential and environmental education. Lentz wonders what sort of measurable link can be made between experiential activities and academic growth, and how the link might be documented. He says "I'm convinced that the cognitive can increase through experiential work. I used to believe that it would be fine if the cognitive just stayed even because so much else of value was happening, but now I'm sure that the cognitive can be shown to measurably increase."

P.A. is concerned with process rather than product, and would not recommend a single pat formula for success. At the teacher training workshops that occupy much of the project's time, teachers' individual situations are considered in the development of specific frameworks they will be able to bring back to their own schools. "We're really only demonstrating process," Lentz insists "and our workshops are only successful to the degree that experiential attitudes get implemented by the teachers." Lentz happily boasts of a high degree of retention for P.A.-instigated program in schools, and says that teacher training is the only real way of changing things. Plug-in programs won't complete the critical transferral of capabilities to teachers and administrators.

Lentz is unhappy with the funding process, suggesting that it fosters too much isolation, too many short term projects and not enough full curriculum development. His suggestions: Go light on administration and heavy on trying things out. Do not be afraid to take chances. Make your projects site-specific, and start small, looking for incremental growth rather than a single big push. And do not get too caught up in planning. "A year to plan? A month is plenty. Planning should be done on the run, in a real situation with real kids. Too much planning makes you stale."

CONTACT

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-- Project Adventure has a long list of publications and consulting services available, and the Project runs a regular workshop series. Teaching Through Adventure is a sensible, readable, and very useful guide to using some of the project's techniques.

PROJECT Q.U.E.S.T.
BROCKTON HIGH SCHOOL

Brockton High School accomodates six thousand students in a huge, sprawling institution outside the city center. When the buzzer goes off to signal the end of a class period quiet hallways are instantly turned into seething, rushing rivers of teenagers, six thousand students trying to get from one place to another at once. This in itself is a significant environmental education, but it was not deemed sufficient by the Brockton teachers who collaborated in 1969 to write a Title III grant proposal setting up an urban environmental education project at the high school. Brockton is a small industrial city in eastern Massachusetts, and its high school is a microcosm of the city. The chance to capitalize on these similarities in teaching values and basic skills encouraged the faculty to create Project Q.U.E.S.T. (Quality Urban Environmental Studies and Training).

Environmental education need not be confined to rural areas, as Q.U.E.S.T. students know, because Brockton is a city, and a city has its own environmental characteristics and concerns. The Q.U.E.S.T. model can be applied to any medium sized city, and it is deceptively simple: Teach students skills which get them involved in the dynamics of their own community, and start close to home. In school. Sounds simple enough, but carrying it out has taken a lot of effort from a dedicated staff, and a lot of initiative from the students.

Gerry Beals, a teacher of high school science, was one of the original developers of the Q.U.E.S.T. plan. He traces its earliest heritage back to the educational climate following World War II, boom years when population and economic expansion in America were responsible for the disappearance of the study of natural resources from schools, and an ignorance of the importance of planning or demographics. The impact of rapid technological growth passed schools by until the late 1960's. Q.U.E.S.T., Beals explains, was designed to fill the gap. The hope is that students educated to the environmental and social factors governing a city's growth will be better prepared to understand and participate in that growth. For cities like Brockton which have sustained boom and bust cycles and face high unemployment, these issues are not idle ones.

The project is broken into two levels, Q.U.E.S.T. I and II. Q.U.E.S.T. I is a prerequisite to the second level, and it is made up of thirty nine day teaching cycles, each cycle including three thirteen day modules. Each smaller module centers on one of the core disciplines included in Q.U.E.S.T. Students

are questioned on their own environmental attitudes, and asked to examine historical attitudes toward the land and energy resources in America and in their own city. During the course of the year they will be exposed to such diverse analytic tools as: "Planning and Engineering Science," "Introduction to Statistics," "Regional Economic Environment," "Social Problems in the Urban Environment," "Introduction to Programming," "Micro-Graphic Analysis," "Environmental Law," and "Water Analysis" (these representative titles are from the Q.U.E.S.T. curriculum guide). Students become capable researchers, learning the necessary skills to collect and interpret data. Computer sciences and statistics are important, but so are social values, a sense of history, and a willingness to compromise.

The mix of technical skills and attitude shaping is evident in the projects students have done. The second level of Q.U.E.S.T. is centered on independent projects, and Q.U.E.S.T. II members this year are building a working model solar heating panel, and redesigning a dish type solar cooker built by an earlier class. In the past, students have attempted such ambitious tasks as surveying Brockton's waterways and producing a report of planning and building options. The program's base of support is cemented by the students' willingness to complete valuable municipal projects. An inventory and mapping of the exact location of city storm drains and hydrants along with an assessment of the possible overflow danger of culvert reduction points are two such efforts, and both are being planned in cooperation with the Public Works Department.

Q.U.E.S.T. staff and students have gleaned some critical lessons in the value of public relations. The project tries to keep its actions in view, especially in the school itself. In one year the project sponsored a school-wide design competition on energy conservation, convincing a department store and some small businesses to donate prizes, and inviting the representatives of these stores to serve as judges. Q.U.E.S.T. students have organized a contest in local elementary schools annually in which children make Christmas tree ornaments from recycled materials, and then they ask tree dealers to donate trees on which to display the results. Last year's Q.U.E.S.T. II group did an extensive survey of Brockton High student attitudes on energy conservation. The class designed a publicity campaign to encourage better conservation practices in the school.

Q.U.E.S.T. students will do soil testing for area gardeners, and when the Massachusetts Association of Conservation Commission held their yearly conference at the school, fifty Q.U.E.S.T. students volunteered their Saturdays

to help run the event. That is the sort of commitment that builds credibility for a program. Peer teaching with younger students is no longer the required part of Q.U.E.S.T. that it once was, "But almost all of the students do it," says project director Maurice Donnelly, pointing out that his students are currently working with special needs classes in the high school, a challenging and expanding encounter.

Project Q.U.E.S.T. takes a lot of effort from the staff, and working on the student projects takes extra time and commitment, but there is no lack of this at Brockton High.

"We've enough projects planned to keep us going for several years," says Donnelly, "As long as the program benefits the students, and the community, we'll keep going."

CONTACT

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- Q.U.E.S.T. has designed curriculum aids of many varieties, and has a thorough Environmental Studies Curriculum which encompasses the Q.U.E.S.T. program, in booklet form.

PROJECT S.C.O.P.E.
ROCKPORT HIGH SCHOOL

If you lived in Rockport, a small town on the coast north of Boston, and you had a craving for a dozen farm fresh eggs, you wouldn't have to visit the supermarket. Instead you might head up to Rockport High School, where students participating in the school's Project S.C.O.P.E. (Satellite Classrooms: An Outdoor Program for Education) raise chickens and eggs for sale.

In 1974 students in a class on conservation techniques complained that they spent too much time talking about conservation and rarely got out of the classroom to actually work in the landscape. The school is located in a rural setting at the edge of town, and flanking the grounds were two farms. As it happened both farmers were facing serious problems as a result of high taxes and a diminishing market for their products. When one of them was approached by a group from the high school and asked if he would be interested in working with school groups on a special agricultural and environmental education project that would use part of his farm, he consented to the unusual offer and Project S.C.O.P.E. was born.

With funding under Title IVC Rockport High School contracted with farmer Kenneth Rowe for the use of his barn and milking herd. A greenhouse kit was purchased and assembled on school land. Compost bins and coldframes were built by the students, and a vegetable garden was planted. The school also established a chapter of Future Farmers of America.

Students who enrolled in S.C.O.P.E. were provided with a dual focus. First, biology, plant and animal sciences, and general ecology were taught in the classroom as academic (albeit quite practical) disciplines. Then all of these were put to direct use in the field, and often in long hours after school, as students struggled with many of the same hardships that had nearly sunk Kenneth Rowe. With the help of their staff advisors, S.C.O.P.E. students designed the program for each semester. Before each term, a student would meet with the staff to determine individual educational goals for the time period ahead.

The opportunity to work with real plants and animals had a compelling effect on students, and marketing what they produced caused them to confront the realities of farming in a way that no class discussion could. They began to take real responsibility for the program. When a bit of vandalism occurred students sought out the offenders and collected damages from them. In another case the CB radio used

to keep the garden and barn in contact with the project's office/classroom was stolen. Students in the program discovered who had taken it and forced the thief to return the instrument, in person, to project director Phil Perry. Perry, science director at Rockport High and the moving force behind S.C.O.P.E., says that even though some program members end up transferring to a local agricultural and technical school, just as many will end up going on to college, including some who went into the project without college preparatory plans. "I think we're educating for attitudes more than anything else," Perry explains, "There are a lot of ways you can teach citizenship and pride. A farm or garden is one good way, and it seems to be working for us."

When initial funding for S.C.O.P.E. ended the town's school committee threatened to terminate the effort. Students and S.C.O.P.E. staff were upset, and went to work to prove that something more than farming was happening in the trailer/classroom behind the garden. They rallied more than three hundred parents on their behalf, crowding into a school committee hearing on the subject. Both budget and staff were cut, but the project survived in a reduced form. Then in 1976 a freak windstorm collapsed the geodesic dome that served as S.C.O.P.E.'s greenhouse, and students saw much of their hard work collapse with it. Kenneth Rowe's dairy herd dwindled to a single cow, but the spirit behind the S.C.O.P.E. idea never faltered. In a way, all this adversity has taught a valuable lesson about determination and survival.

The project licked its wounds and began to rebuild. Salvaged materials from the old greenhouse will become a new one. The project has weathered loss of funds, storms, staff changes, and still survives. It expects to survive for quite awhile. Says director Perry, "I think we're starting to be seen as an integral part of the education around here."

CONTACT

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-- S.C.O.P.E. has many well written guides to using specific farming and gardening activities in an academic setting.

III PROGRAM ABSTRACTS

The following short descriptions of EE efforts at schools throughout the Commonwealth, are intended to stimulate communication. By providing descriptive abstracts and addresses we hope to spur those working in the field to connect their efforts, and to offer a framework into which someone just entering the field might place their own proposed work.

1. AMHERST REGIONAL HIGH SCHOOL

The science department offers an elective course in "Environmental Sciences" and the social studies department provides "Technology and the Environment". The first is strictly scientific, while the second considers the relationship of politics and social or cultural affairs to environmental decision-making. Taken together they provide a strong EE. An "Alternate Energies" course looks at all forms of energy production comparatively. In one biology course a series of thirteen local field experiences has been substituted for labs, placing an emphasis on understanding the immediate environment.

Contact: James Scott
Science Department
Amherst Regional High School
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Amherst, Massachusetts 01002
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2. AMHERST REGIONAL JUNIOR HIGH SCHOOL

Seventh through 9th grades offer sciences with an environmental base, including extensive outdoor work examining the surrounding countryside. The standard 9th grade science offering, "Probing the Natural World", studies essential concepts of environmental science, and one teacher has worked with a local nature center to devise the "Ecology Box", a curriculum adapted to local conditions, centered on discovery.

Contact: Gail Stilson
Science Department
Amherst Regional Junior High School
Chestnut Street
Amherst, Massachusetts 01002
(413) 549-3975

3. A.N.I.M.A.T.E.

Animals and Nutritional Information Modifying Attitudes Toward Education is a project geared

for low success or potential drop-out students. It presents a variety of possible vocational choices while graphically illustrating both the need for good personal health habits and the connections between personal and social well being. Students work with farm animals during the school day.

Contact: Carolyn Tolman
Leominster High School
Leominster, Massachusetts 01453
(617) 537-9511

4. ASHLAND EDUCATIONAL COMMUNITY CENTER

The community education wing of Ashland High School has established a biological farming project, setting up a community garden worked by students. Produce is sold to cafeterias, community members, and local restaurants. The program currently exists only as a summer employment effort funded by C.E.T.A. and Neighborhood Youth Corps, but the staff hope to expand the gardening project into a high school curriculum, and a resource for teachers.

Contact: Jackie Borck
Ashland Educational Community Center
Ashland High School
Ashland, Massachusetts 01721
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5. B.E.E.P.

The Bedford Environmental Education Program is a curriculum pilot project designed jointly by staff in the Bedford schools and environmental education specialists from Elbanobscot, Inc. The program will establish comprehensive programs in Bedford at the elementary level. Materials and results of the pilot are currently in preparation.

Contact: Cricket Boyle
B.E.E.P. Director
Davis School
Bedford, Massachusetts 01730
(617) 275-6804

6. BELMONT ELEMENTARY SCHOOLS

Two fourth grade teachers in a Belmont school have written a complete and easy-to-follow lesson plan and guide to nature studies, called "Environments". Based on SCIS environments unit, the plan uses some concepts from that text but isn't entirely based upon them. Directed at the specific conditions around their school, the plan could be applied in most any schoolyard environment.

Contact: Patricia Dwyer, Carol Gay
Wellington School
121 Orchard Street
Belmont, Massachusetts 02178
(617) 484-8668

7. BROOKWOOD SCHOOL

The school's outdoor program draws on some aspects of the Project Adventure model (ropes courses, challenge and reward through physical activity) and blends them with an environmental awareness program to provide a broad-based educational effort, demonstrating that even transitional grade students at grades 6, 7 and 8 can benefit from an outdoor environmental challenge, not just high schoolers. The school has trip descriptions written up, and offers consulting services and the use of its facilities.

Contact: John Dyett
Brookwood School
Brookwood Road
Manchester, Massachusetts 01944
(617) 526-7596

8. CAMBRIDGE SCHOOL OF WESTON

In addition to a diverse outdoor adventure and exploration program conducted as part of the physical education department, this school offers a "Global Perspectives" elective course for sophomores, tying energy, environmental, political, social, and cultural issues into the development of a wholistic world view. The school is also seeking funding for a projected dormitory residence, called "Life-dorm", a live-in learning laboratory for students using alternate energy sources.

Contact: David Hurst
Director of Development
Cambridge School of Weston
Weston, Massachusetts 02193
(617) 893-5555

9. CARROLL SCHOOL BOUNDERS

The Carroll School offers an outward bound-type program, sponsored by the Hurricane Island Outward Bound School, specially designed and implemented to meet the needs of dyslexic or perceptually handicapped children, ages eight through fifteen. The idea involves using controlled outdoor challenge to help overcome physical or emotional handicaps brought on by perceptual problems. The school offers apprentice training and consulting services in its program, and makes equipment available to other groups on a barter or exchange basis.

Contact: Michael Stratton
Carroll School Bouders
Baker Bridge Road
Lincoln, Massachusetts 01773
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10. CONCORD ELEMENTARY SCHOOL

Concord has implemented a locally developed and directed environmental curriculum for grades K-6. Using school grounds and surrounding natural areas, and depending on a carefully maintained and trained corps of volunteers from the community for instructional support, the program is science oriented but not restricted to that subject. Starting with simple schoolyard exploration and gearing up to an eventual study of a sewage treatment facility within a natural wildlife area, students become familiar with ecological concepts and their social ramifications. All materials have been developed by the school system.

Contact: John Benjamin
Concord School Department
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Concord, Massachusetts 01742
(617) 369-9500

11. GATEWAY REGIONAL HIGH SCHOOL

Gateway is a rural school offering students a variety of environmental course possibilities. "Forestry" acquaints them with the plant and forest sciences, management practices, and product uses, including work in the woods and visits to managed forests and sawmills. "Limnology" explores testing techniques and water pollution issues. "Economic Botany" is essentially a course in the identification and use of edible wild plants. The purpose of these offerings is to familiarize students with the local environment, creating respect and responsibility.

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Huntington, Massachusetts 01050
(413) 667-5767

12. GLOUCESTER HIGH SCHOOL

Gloucester's museum school program is a special counselling and activity-oriented effort to handle students who have left school, been suspended, are potential drop-outs, or do not function well in the school system normally. One major component of the museum school is outdoor exploration, especially rock climbing

and dory trips along the coast. Students in the program learn not only to handle themselves confidently in the outdoors (which will hopefully let them move back into the general school population with similar confidence) but to build the dories they sail. All boats used by the program have been built by students there.

Contact: Jerry Hart
Learning Options Coordinator
Gloucester High School
32 Johnson Road
Gloucester, Massachusetts 01930
(617) 281-2870

13. GREATER BOSTON RESOURCE PROGRAM

A program in a Belmont elementary school brings suburban children into closer contact with Boston, exposing them to the city's institutions and systems in a simple and non-threatening manner. Field trips to cultural institutions are preceded by extensive in-school study, in which young students play games, make models, and draw and study maps to develop an understanding of the institution they'll visit. Travel to and from is usually by public transportation, to acquaint students with another aspect of the urban scene.

Contact: Carol LaFontaine
Daniel Butler School
Belmont, Massachusetts 02178
(617) 484-3519

14. H.U.E.S. PROGRAM

H.U.E.S. (Historical and Urban Environmental Studies) is jointly sponsored by Boston University's Human Environment Institute and the National Park Service. It is an experimental effort to provide thoroughly researched and planned urban environmental field experiences for schools, with a special emphasis on the growth and cultural development of cities. Students participating in a H.U.E.S. project will be prepared by their own teachers and the H.U.E.S. staff beforehand, then they'll explore an unusual part of Boston in depth. The point is gaining an understanding of the complex social and environmental make-up of an urban center, and the evolution over time of such a place. H.U.E.S. services are available to any school, and the program is centered in the Boston National Historical Park.

Contact: Ellen Fineberg, Coordinator
H.U.E.S. Program
Boston National Historical Park
Charlestown, Massachusetts 02129
(617) 242-3135

15. LINCOLN-SUDBURY REGIONAL HIGH SCHOOL

Several science electives are environmentally based, but one in particular, periodically offered to juniors and seniors, is "Environmental Issues", a multi-disciplinary examination of overpopulation; air, water, and noise pollution; ecology; energy; town and community planning; and food and nutrition. The course attempts to focus attention on large scale issues by examining the immediate surroundings with field trips and the inclusion of outside speakers.

Contact: Betty Busiek
Science Department
Lincoln-Sudbury Regional High School
390 Lincoln Road
Sudbury, Massachusetts 01776
(617) 443-9961

16. MASCONOMET REGIONAL HIGH SCHOOL

An environmental science program here meshes with an outdoor and experiential adventure effort, including extended dory trips and camping, while studying the local landscape. Primary attention is given to examination of the seashore and human interaction with the sea, marine studies, and sciences.

Contact: Larry Uhrich
Masconomet Regional High School
Endicott Road
Topsfield, Massachusetts 01983
(617) 887-2323

17. MILTON ACADEMY

Middle school students here worked alongside faculty advisors to build a solar heated greenhouse and laboratory called S.E.A.L. (Students Exploring Alternative Lifestyles). S.E.A.L. studied environmental policies and the effects of pollution, and considered the possibility of life without fossil fuels or common conveniences. Now the greenhouse is used as a lab and classroom for the school's environmentally based science curriculum.

Contact: Jack Barber
Science Department
Milton Academy
Milton, Massachusetts 02186
(617) 698-7800

18. MILTON PUBLIC SCHOOLS

Sixth graders in Milton are provided with a residential, four-day outdoor environmental experience at a rural site, where they participate in academic, adventure, and athletic activities. Program staff would be happy to share their experiences with other schools attempting such an effort.

Contact: Paul Scopa
Elementary Science Coordinator
Milton Public Schools
381 Centre Street
Milton, Massachusetts 02186
(617) 696-7220

19. MOUNT GREYLOCK REGIONAL HIGH SCHOOL

The "Community Studies" program at Mount Greylock combines science, social studies, and history in an intensive, cross-disciplinary effort. The program is open to sophomores who can commit the final four periods of an eight period day. The students take significant responsibility for the organization of the course as active participants in field trips, peer teaching, group projects, and independent work.

Contact: Mitchell Backiel
Mount Greylock Regional High School
Cold Spring Road
Williamstown, Massachusetts 01267
(413) 458-8164

20. NATICK COMMUNITY FARM

A social service project in Natick has established a working farm run by young people, with a garden, animals, and a maple sugaring operation. The farm is extensively used by schools for field trips, and the farm staff have developed extensive study guides, materials, and explanatory texts to accompany the visit. Staff works closely with Natick schools, which has enabled some students to complete independent or work study projects at the farm.

Contact: Mark Winne
Natick Community Farm
10 Wilson Street
Natick, Massachusetts 01760
(617) 655-5858

21. NATICK HIGH SCHOOL

Natick High has built its own nature trail, and offers a second year advanced biology course centering on environmental and outdoor study. The class examines and analyzes environments surrounding the school, including a large pond on school grounds, and studies water, air, energy, conservation, and recycling issues. Staff is very willing to share their work with others.

Contact: Charles Bohannon
Natick High School
15 West Street
Natick, Massachusetts 01760
(617) 653-0550 X214

22. NEEDHAM PUBLIC SCHOOLS

Needham has attempted to infuse a broad-based environmental emphasis into the science education in their schools, using an outdoor natural studies area as well as the school science center. The staff has developed curriculum and study guides for an environmentally based approach to ecology, biology, and chemistry.

Contact: Peter Nelson
Director of Science
Needham Public Schools
609 Webster Street
Needham, Massachusetts 02194
(617) 444-4750 X40

23. NEWTON JUNIOR HIGH SCHOOL

One of the oldest and best established outdoor education efforts in the state, Newton Junior High School each year offers students a mountain hiking program closely tied into the school science effort. A rigorous climb in New Hampshire's White Mountains is accompanied by a thorough and diverse curriculum package exploring everything from ethics to survival science. The resource packet designed and written by staff and teachers from Newton is comprehensive, covering details of all sorts as well as curriculum options. (See listing in Resources section of this publication.) Staff has accumulated valuable experience in operating outdoor education activities.

Contact: Bill Redomsky
Newton School Department
265 Watertown Avenue
Newton, Massachusetts 02158
(617) 552-7621

24. NEWTON NORTH HIGH SCHOOL

Science education at Newton North has broadened into other disciplines and concerns, including a course on greenhouse management taught in the school's own facility which prepares students for possible employment in a horticultural profession while teaching basic plant sciences. An environmental chemistry offering emphasizes testing techniques and the use of monitoring equipment, as well as essential chemistry information. An extra-curricular biology club has evolved into an ecology action organization, undertaking community projects and an advanced placement biology elective. The staff has developed extensive resources and related curriculum materials.

Contact: Harold Wiper
Riley House
Newton North High School
Newtonville, Massachusetts 02160
(617) 522-7459

25. NORTHAMPTON ELEMENTARY SCHOOLS

Local CETA funding was used to hire two environmental consultants who worked with teachers and administrators to develop curricula and materials which expanded students' contact with environmental studies. Consultants led field trips, initiated and supervised garden projects, wrote study guides for open space use, and collected materials. The elementary science department functions as a resource center for teachers interested in infusing an environmental aspect into their work. A locally developed curriculum guide encourages use of local resources. Funding cuts threaten future use of consultants.

Contact: Fred Morrison
Elementary Science Coordinator
D.A. Sullivan School
Williams Street
Northampton, Massachusetts 01060
(413) 584-9596

26. PEABODY PUBLIC SCHOOLS

Sixth graders in Peabody spend five consecutive school days at a piece of conservation land where they're exposed to the basics of environmental science in a first hand way. In junior and senior high school students have the option to continue their environmental education by using a greenhouse on campus or participating in elective environmental science and ecology course offerings. The school makes active use of town conservation

land, including a two-hundred acre orchard. The intent is an integrated environmental effort within the curriculum, not an added outside project.

Contact: Edgar N. Johnson
Educational Director of Health
Peabody School Department
Peabody, Massachusetts 01960
(617) 531-1600 X129

27. PIONEER VALLEY REGIONAL SCHOOL

The standard 7th grade science curriculum has been replaced by an environmental studies program at this junior and senior high school. The school has developed a pond and nature trail on campus as teaching aids, and the whole science curriculum has an environmental emphasis concerned with local situations. The high school also offers a semi-vocational "Careers in the Outdoors" course which familiarizes students with what's involved in vocational options such as forestry, sewage and waste treatment, and landscaping. Students from this course have built and are using a sugar house on campus.

Contact: John T. Callahan
Pioneer Valley Regional School
Northfield, Massachusetts 01360
(413) 498-2931

28. PITTSFIELD PUBLIC SCHOOLS

The Pittsfield school department's science coordinator led the development of a strong environmental emphasis in Pittsfield schools. Working with teachers from the junior high, a text for 7th grade science was developed with a locally oriented environmental approach. In addition, the schools have a formal arrangement with local nature centers (Audubon sanctuary, Berkshire Garden Center) involving regular field experiences and instruction by naturalists. This consultant instruction is alternated with regular teacher work, providing a variety of offerings and a stimulating pattern for students.

Contact: Anne Nesbit
Science Coordinator K-12
Pittsfield, Massachusetts 01201
(413) 499-1234

29. PROJECT BLUEBERRY

Not strictly environmental in focus, Project Blueberry is a novel effort funded under Title IVC. It combines an English course with the use of cable television production equipment, ending up a "Foxfire"-type video product. Students in the course pursue community studies and history projects, researching aspects of their own cultural history and that of their neighbors, while learning to use video equipment. Eventually they produce several documentary programs for local cable television airing, which bring alive the cultural environment of the area.

Contact: Mark Caron
Project Blueberry
Hampden-Wilbraham Regional Schools
621 Main Street
Wilbraham, Massachusetts 01095
(413) 596-9011

30. PROJECT ENTERPRISE

This project attempts to give students a tangible understanding of some of the academic subjects they're studying through work experience. Historic preservation, carpentry, and actual renovation of an old house enhance local history. Forestry, and farm and orchard work enliven science. Water pollution research and application of skills are locally based. Students gain access to professionals in a field while still in school.

Contact: Thomas Parker
Project Enterprise
Marshfield High School
Marshfield, Massachusetts 02050
(617) 837-1161

31. PROJECT EXPLORATION

This multi-disciplinary resource center is involved in a wide range of school activities: designing new courses in conjunction with teachers, operating field experiences, administering a student produced journal of community history, and serving as a center for innovative ideas.

Contact: Paul McGowan
Project Exploration
North Middlesex Regional Schools
Main Street
Townsend, Massachusetts 01469
(617) 433-5309

32. PROJECT M.U.N.C.H.

Primarily concerned with health and nutrition education, the project explores the connections between nutritional habits and environmental attitudes. Students are given the opportunity to participate in school menu planning, food ordering, and meal serving. Waste is studied and questions of food scarcity are addressed, causing students to begin looking more carefully at their own place on the food chain. M.U.N.C.H. uses nutrition to "accomplish our goals of educating children to be physically well beings with a respect for the environment."

Contact: Duncan Stewart
Project M.U.N.C.H.
Oakum Center School
Coldbrook Road
Oakham, Massachusetts 01068
(617) 882-3392

33. QUINCY PUBLIC SCHOOLS

For some time Quincy science education has had an environmental emphasis, with a recent occupational education grant bringing a project in sewage treatment and pollution control to the high school. Quincy is currently putting into operation a new elementary level curriculum, Project I-C-E (Instruction-Curriculum-Environment), an interdisciplinary environmental studies project nationally developed but applied for the first time this year in Quincy.

Contact: Vincent P. Sullivan
Coordinator of Science
Quincy Public Schools
Quincy, Massachusetts 02169
(617) 471-0100

34. SANDY NECK ENVIRONMENTAL CURRICULUM

A Coastal Zone Management Commission grant, along with regular school funds and support from the town conservation commission, helped a Barnstable High School biology teacher to design and execute a detailed marine science research project near the school. Students were instructed in, and performed, all basic research tasks. The concentration was on the interaction of human and coastal environments, and results of the study were made available to the C.Z.M. Commission. The school hopes that this may be a prototype for using students as research assistants on projects of real demonstrable value. A curriculum package is under development.

Contact: Peter Auger
Barnstable High School
774 West Main Street
Hyannis, Massachusetts 02601
(617) 775-2600

35. UMBILICUS PROJECT

Aggressive fund-raising and dedication by a few faculty members at a private school has resulted in the construction of a unique educational facility, called "Umbilicus". The space is a greenhouse wing attached to the biology room, containing equipment needed for indoor solar aquaculture, experimental planting beds, solar panels for hot water heating, a rock storage system to preserve heat, a windmill for electricity production, and a computer link-up to monitor all operations. Students perform experiments in "Umbilicus", and many participate in an elective course called "Biosphere and Ethosphere" which explores the role of culture and society in determining biological decisions.

Contact: Fred Sculco, Director
Umbilicus Project
Noble and Greenough School
507 Bridge Street
Dedham, Massachusetts 02026
(617) 326-3700

36. WAYLAND HIGH SCHOOL

Special funding from local school monies for staff and curriculum development, has given Wayland teachers the opportunity to create innovative educational options. The junior high offers a four-day residential environmental experience, and a challenge and survival physical education course which takes an extensive canoe trip each year. A ninth grade project uses Project Adventure techniques to build confidence, personal pride, and social responsibility. An eighth grade course involves urban METCO students and Wayland residents in examining natural and cultural environments of their respective communities. A biology class concentrating on water compares findings from an oceanographic field trip to those made on the local Sudbury River.

Contact: Andrew Platt
Assistant Superintendent of
Curriculum
Wayland School Department
57 Cochituate Road
Wayland, Massachusetts 01778
(617) 358-7728

37. WELLESLEY HIGH SCHOOL

Begun out of the independent study of one senior some years ago, Wellesley High School boasts a student operated and maintained garden plot, using all organic methods, on two acres of town owned land within walking distance of the school. Students collaborated with a teacher to design a horticulture curriculum which will be used in the school next fall, and are currently lobbying for funds to construct a greenhouse. Seniors make use of an alternate semester independent study elective to work full-time in the garden or take internships in related areas.

Contact: Science Director
Wellesley Youth Farm
Wellesley High School
50 Kingsbury Street
Wellesley, Massachusetts 02181
(617) 235-7618

38. WESTFORD ACADEMY

"Environmental Planning" at Westford Academy is an unusual high school elective that teaches skills planning, resource analysis, and graphic presentation. The entire year is devoted to a single group project, performed by the class as if they were on contract to an actual client: their own town.

Contact: Joseph Freitas
Westford Academy
Patten Road
Westford, Massachusetts 01886
(617) 692-2551

39. WILBRAHAM TRANSITIONAL SCHOOLS

Grades 4-6 in Wilbraham have the opportunity to study a combined offering in health and environmental studies. The environmental education teacher and health teacher switch off with one another, each taking a quarter semester. The two areas are related for children by an emphasis on the connections between personal health and environmental conditions. Schoolyard exploration, elementary examination of pollution and ecology issues, and frequent contact with environmental news stories prepares children early for a better understanding of the importance of environmental quality.

Contact: Adolph S. Jurczyk
Soule Road School
Wilbraham, Massachusetts 01095
(413) 596-9313

IV RESOURCES

"Something old, something new, something borrowed, something blue..."

And something useful too, we hope. The old double bind of environmental education, that broadness of focus which is both liberating and frustrating for its liberating effect, rears its head again when we go out looking for resources for environmental education. On the one hand resources are everywhere. This pat, over-simplified solution does have some truth in it. There is nothing essential to teaching environmentally other than a willingness to try things and look carefully at the world around you. But that world might be anything from a school classroom to a mountain range or salt marsh, to your state, this country, the entire world or universe. There are no limits. Nothing is too small, and nothing too big if approached for applicable lessons.

Starting is a difficult proposition. You may have a great notion of what to do but no idea at all of how to do it. You might have some difficulty overcoming the suspicion that, even though you are possessed of an exciting and dynamic idea, you are missing the "training" or "background" you need. This book has tried to present a collection of differing approaches, and it has tried as well to dispel the image of environmental education as requiring extensive facts or materials. Still, you cannot make a cake from air or a house without lumber. The following section hopes to provide you with some tools.

Education somehow always gets back to BOOKS. We have included a number of different sorts of books in this bibliography. Some are nuts and bolts manuals on how to get started, keep going, or change your direction. Some are other guides to resources, and even guides to guides! Still others are less specific and concern themselves with the reason for teaching environmentally in the first place.

MAGAZINES and PERIODICALS are a lively, timely way of keeping what you teach well linked to current events. Many publications offer special school reprints of certain articles. Different journals speak to different audiences, and we have selected a couple that seem frequently to have good coverage of environmental issues, and that might make interesting material for a class discussion or project.

Support is very important when starting something from scratch. You wonder whether anyone else has done anything like it, and if so what their experience was. Backing can come

from members in the ORGANIZATIONS and INSTITUTIONS included in this resource section. They are established precisely for the purpose of sharing among interested teachers and staff, skills, experience, enthusiasm, hunches and hopes, information and inspiration.

Finding a continuing source of background material for your work, once you have decided to do it, can be another stumbling block on the route toward a smoothly functioning program. Very few of us have time to sift through all the information easily available for that which is actually useful, determining what would be applicable for the next term's class, designing a brilliant new course of study each semester. Yet it is important to keep the material fresh, the exercises new and stimulating, if only to maintain our own interest. How can things be kept current and lively without sufficient time? One answer is to ask for help, and the cultural institutions, resource centers and assistance groups gathered in this section should produce good results. Of course there is not enough room here to list every possible source, so we have included guides to these places as well. The important thing is the realization that there are people out there whose job it is to help you out. Use them!

Sooner or later it seems as if every educational program with the word environmental attached to it will want to go out into the field, whether that be sylvan wilderness or the Combat Zone. Environmental education is inherently prone to field tripping. As every teacher can attest, this is a mixed blessing. Yes, a good field trip may create lasting interest in a subject and reawaken deadened students. But a field trip which begins as a bright idea may end up as a nightmare. Transportation, scheduling, permissions, preparation, follow-up, on and on the list goes. Running a truly excellent field trip is like art; it takes a lot of talent and a bit of luck too. The whole thing can be made somewhat easier by visiting places already geared up for school groups, such as some of the environmental centers included in this book.

So you want to build a solar collector with your class, plant a garden, collect soil samples and study them, or set up a ropes course. How do you do it, and where do you get the materials, without any budget to speak of? The first and last word on this issue is scrounge. It is amazing what can be done with waste materials: old tires, cardboard cartons, jars, and tins. Start out close to home (or the classroom as the case may be). What does the school cafeteria toss out each day? What about the maintenance department, the wood or metal shop? Then go further afield. If you keep animals you might visit local supermarkets and restaurants and leave a container, asking them to save scraps for you. Furniture stores, appliance outlets, and motorcycle dealers will all often have

wooden shipping crates to get rid of. If you are doing a special project (building a windmill, planting a garden, etc.) that has high visibility, consider asking for material sponsorship for your work. Offer to write the name of your sponsor all over the place. If the little league can cover their outfield fence with advertisements, you can fence your garden with them too.

The scrounging process is an environmental education in itself, and students who are expected to round up the materials needs for a project will have a deep and lasting sense of what is actually needed to do something. The getting there can be as important, educationally, as the end itself. So hustling and scrounging need not be seen as odious tasks done only because there is not enough money to avoid them. In fact, they ought to be embraced as part and parcel of the whole learning process. Recycling and fuller use of our limited natural resources is the key lesson in any sort of environmental education. A selection of books including plans for innovative projects with scrounged materials, as well as some places to look for bargains, are listed in the CURRICULUM RESOURCES section.

And now the bottom line, some comments on funding, or "Where is the money?"

The world of funding, especially large scale or federal funding, is incredibly complex and tortuous. There are literally hundreds of slightly differing categories, entitlements, and discretionary funds. Probably the most effective way to sift through all these to find the one best suited (or most likely) to fund your own efforts is to sit down with someone from your regional office of the Massachusetts Department of Education (see inside back cover for addresses). If you have an idea and you feel that you absolutely must have outside funding for it, the people at your regional office can help you to figure out what you are eligible for and how to apply for it. But a few cautionary notes are in order.

There is not much of it, especially in "environmental" categories. Try looking to other areas, filling dual needs with your work: occupational education, equal opportunity, special education, or bilingual education. Because almost any area can have an environmental approach applied to it you may be able to qualify for funding in a category other than "environmental education", the funds for which are extremely tight. Perhaps the best source of funding is not even within education? How about offices like the Department of Energy, the Department of Transportation, or the Environmental Protection Agency? If your work overlaps into their areas you may be able to collect support. Coming closer to home, it is worth looking around to see what needs to be done in your community,

then offering to do it in exchange for full or partial support of your school program: working on town conservation land, monitoring pollution locally, doing survey or mapping work in the town. The school board or town board of selectmen may be persuaded to grant extra monies if they see a demonstrable service to the community resulting.

What funding there is is hard to get, and when you get it you may wish you had not. That is hard to believe, but not one of the program directors I met had good things to say about the day to day routine of paperwork and bureaucracy involved in managing a large grant. This is not to scare you off from looking for it, just to give fair warning. In some subtle ways a lot of money can be more trouble than none. In extreme cases it can hurt the chances for your effort's long term success by misdirecting your energies into the soliciting and management of funds instead of the laying of a strong foundation of school and community support. This can be alienating, and create bitterness. Go carefully into the world of grant funding, and stay alert to the dangers as you seek out the benefits.

An alternative approach is the development of local sources of funds. Rather than looking for a big grant to establish a big program, start small and build slowly. Many industrial companies have charitable foundations associated with them; if one has a plant or offices located in your area try approaching them for support. How about small contributions from local merchants or businesses? Or donations in kind, of materials and services, from people whose skills from which you could really benefit. For example, if you are raring to build a greenhouse behind the school you could look for a grant, or you could get help from a plumber, a carpenter, an electrician, and supply stores.

Many programs raise money directly for their own purposes, committing themselves to the labor involved in paper drives, pledged races, plant and bake sales, or car washes. Be innovative. How about weatherstripping and caulking windows in the fall, with the proceeds going to the school's environmental education fund?

There is no easy way.

Raising money, no matter how it is done, takes time, energy, and belief. Money is a central ingredient in most everything done at schools these days, and money is harder and harder to come by. Doing things that cost less money relieves the burden somewhat. Raising what money you must have from within the community will guarantee that the work being done actually meets community needs, and thus may assure a longer life for the project. These are not the only answers, but they are possibilities. And they are not heard often enough.

Finally a few notes on all this. Do it yourself whenever possible. Do not expect someone else to have done the work for you, so that all you have to do is plug it in. Environmental education does not work that way, and should not. Besides, others do not have any more free time than you do, and they are not half as concerned with the quality of your results as you are. There is no such thing as a ready made environmental program and any attempt to transfer something intact is doomed. Use ideas and inspiration freely. Apply elbow grease liberally as needed.

Please use resources thoughtfully. This publication is well peppered with names and addresses of very busy people. Each one of them is willing and able to help get your work off the ground, but be considerate. Use them, do not abuse them, or they will never make the mistake of allowing themselves to be listed again.

And a last comment on the nature of nature, or of environmental studies. Be adventurous. Try things. Nothing good ever happened without someone taking a chance. Wade in and get muddy, go way out on a limb, stand up for what you believe even if you are not absolutely sure you can pull it off. Do not be afraid to do things that might be called strange. Remember that the point of environmental education is to demonstrate the interrelationships between all things, so examine what is around: desks, pencils and blackboard before gazing out the window, schoolyard before the woods, and the local forest before a distant mountain trip. Flush a toilet. That is a field trip that is easy to run, easy to control, and infinitely interesting.

As you expand the walls of your classroom by bringing things in or taking students out, keep a record of what you do, when, and with what resources. The record is a sort of map that will help you and others repeat successful events and avoid disasters. In many ways that is what environmental education does best: makes maps. So please go out adventuring and gathering. Take your students along, make your maps and discoveries together, and share them around. We will all benefit.

Good luck!

BOOKS

From: Professor Allen Wakstein, Department
of History, Boston College, Chestnut Hill,
MA 02167

1. ACCLIMATIZATION

Steve Van Matre
American Camping Association

This essay, in book form, lays out the framework for environmental experience building in a constructive, logical manner. The idea of "acclimatization" is that any environment can be used as the vehicle for expanded physical, emotional, and intellectual awareness. This is the conceptual base for the best of current outdoor education efforts.

From: Acclimatization Experiences Institute,
Box 841, Lake Geneva, WI 53147

2. ACCLIMATIZING

Steve Van Matre
American Camping Association

If Acclimatization got you interested in a holistic approach to outdoor environmental experiences, then this workbook/manual will be just the thing you're looking for. Provides a sequence of field exercises for implementing the philosophy of acclimatization. Clear, accurate, and easy to follow.

From: Acclimatization Experiences Institute,
Box 841, Lake Geneva, WI 53147

3. BASIC ECOLOGY

Ralph and Mildred Buchsbaum
Boxwood Press, 1957

Teachers of ecology will need no introduction to this little book, first printed in 1957 and regularly updated. Probably the best introduction to ecology and the concept of environmental balance ever written. Readable and clear for the junior high school and up.

From: Most textbook suppliers, or
The Boxwood Press, Pittsburgh, PA

4. BOSTON'S HISTORY: A RESOURCE BOOK

Staff of "The Boston Experience"

A practical, hands-on guide to using the city as a learning laboratory. Includes bibliographies and resource locators for both students and teachers, an audio-visual resource list, and a working guide to the city's institutions and places of interest.

5. CITY

David McCaulay
MacMillan and Company

In this book McCaulay does for the evolution of a city what he did in Underground (see #23). First rate drawings and clear text describe the myriad elements on an urban scene. If a student ever asks what a city actually is, point them at this book.

From: most bookstores

6. ECOLOGY, ENVIRONMENT AND EDUCATION

R. Thomas Tanner
Professional Educators Publications, Inc.,
1974

Focuses on major issues in environmental education and details what might be needed to establish a quality program. Looks at urban environmental work, reviews selected sample programs and instructional materials, and examines teacher training at professional centers.

From: Professional Educators Publications,
Inc., Lincoln, NB 68501

7. ENVIRONMENTAL EDUCATION

William Stapp and James Swann, editors
John Wiley & Sons, 1974

Theory and practice of environmental education by a variety of writers and practitioners, covering the history and development of the movement, and including suggestions on curriculum planning. A good handbook for planners and administrators; interesting reading for anyone.

From: most textbook distributors

8. ENVIRONMENTAL EDUCATION ACTIVITIES MANUAL

William Stapp, editor

A six volume manual listing three hundred possible environmental education activities.

From: Dorothy Cox, 30808 LaMar Street,
Farmington Hill, MI 48024

9. A GUIDE TO NEW ENGLAND LANDSCAPE

Neil Jorgensen
Barre Publishers, 1971

A must for anyone taking kids outdoors. It covers bedrock geology, the effects of glaciers, and vegetation. Makes a trip outside an important learning experience.

From: most bookstores

10. HOW TO START A SCHOOL GARDENING PROGRAM

Peter J. Wotowiec
Gardens For All

A clear step-by-step handbook especially for teachers and administrators interested in starting an educational gardening project at their school. The book includes a sample curriculum and lessons plans.

From: Gardens For All, Shelburne, VT 05482

11. THE IMAGE OF THE CITY

Kevin Lynch
M.I.T. Press

The author wonders what makes a city a city, and looks into the question with Boston as one of his central examples. What he finds is that the exchange between people and geography produces a unique image, an image always evolving and changing. And he wonders too, how can we control that change? Great ideas, thoroughly ecological in the best sense of the word.

From: most bookstores, or The M.I.T. Press, Cambridge, MA 02142

12. IN AND OUT OF BOSTON WITH CHILDREN

Bernice Chesler
Barre Publishing, 1975

A wealth of information on activities and places to go with children in the greater Boston area. Sections on open space and parks, recreation, and organizations to contact for more information. Handy and useful for teachers as well as parents, especially for trip planning.

From: most bookstores

13. THE NEW GAMES BOOK

Andrew Fluegelman, editor
Doubleday & Company, 1976

Having fun, taken seriously. One aspect of environmental education, sometimes overlooked (or underplayed?), is athletics or playing environmental games. Games can be great teachers of serious concepts, like cooperation and confidence. This collection of games emphasizes cooperation and collective pleasure, not competition and winning. Excellent resource for teaching any age group.

From: most bookstores

14. OUTDOOR EDUCATION EQUIPMENT

Russell Bachert and E. L. Snooks
The Interstate Printers and Publishers, Inc., 1974

Plans for making and using many items useful in exploring the environment, gathering data, and solving problems. Topics covered include animal life, mathematics, water, weather, and soils.

From: The Interstate Printers and Publishers, Inc., Danville, IL 61832

15. OUTDOOR SCIENCE FOR ELEMENTARY GRADES

John H. Rosengren
Parker Publishing Company, 1972

A book packed with ideas, units, and activities suitable for expanding an elementary school science program beyond the walls of the classroom, with a listing of good resource materials.

From: Parker Publishing Co. Inc., West Nyack, NY 01994

16. A RESOURCE GUIDE TO OUTDOOR EDUCATION IN NEW ENGLAND

Elaine Barber and Will Phillips, editors
Massachusetts Environmental Education Society, 1978

A clear and comprehensive reference to resources, facilities, and organizations useful to anyone working in environmental education. Very well indexed and edited.

From: Massachusetts Environmental Society, 15 State Street, Boston, MA 02109
\$5.50, post paid

17. SMALL WORLDS: A FIELD TRIP GUIDE

Helen Ross Russell
Little, Brown & Co., 1972

A look at microcosms for grades 3-6, examines the habitats of insects, trees, and algae, and explains where to find them. Designed to make children more aware of these environments, and thus more aware of their own.

From: most bookstores and textbook distributors

18. A TEACHER'S GUIDE TO MARINE EDUCATION

Thomas J. O'Regan and Frank Sullivan,
editors
Marine Sciences Institute, 1978

A thorough and wide ranging guide to marine education resources, primarily on the north shore. Covers everything from museums to sea going laboratories, field trip opportunities to shellfish identification. A real asset to anyone planning a coastal trip with a school group.

From: Marine Sciences Institute, Salem State College, Salem, MA 01970
\$3.00

19. TEACHING THROUGH ADVENTURE:
A PRACTICAL APPROACH

Project Adventure, 1976

A lively and inspiring handbook containing curriculum samples, illustrations, worksheets, 'how-to' information, and advice on planning and implementation. Combines personal experience with solid instruction on involving a direct experiential component in an educational program.

From: Project Adventure, Box 157,
Hamilton, MA 01936
\$5.50, post paid

20. TEN MINUTE FIELD TRIPS

Helen Ross Russell
Little, Brown and Co., 1973

For the teacher who can't figure out how to get kids out of the classroom, into coats and mittens, out to the schoolyard, back again in a single class period, and get anything done while you're at it. Plant and animal ecology, and a good list of possible activities in a paved place are included.

From: most bookstores and textbook distributors

21. WHAT TIME IS THIS PLACE?

Kevin Lynch
M.I.T. Press

The author tries to figure out what we've overlooked in our analysis of environments, and concludes that we haven't learned well enough to observe and take into account the passage of time. He does so. Simple, and in its way radical, the book is an ideal teacher resource for those interested in going a bit deeper into environmental studies.

From: most bookstores, or The M.I.T. Press,
Cambridge, MA 02142

22. TREES AND SHRUBS OF NORTHERN NEW ENGLAND

Albion R. Hodgdon and Frederic L. Steele
Society for the Protection of New Hampshire Forests, 1971

A field guide, simply laid out, with good line drawings. Could be easily understood by high school age. Pocket sized, accurate and local, plus the fact that its sale supports a fine group.

From: SPNHF, 5 South State Street,
Concord, NH 03301
\$2.00

23. UNDERGROUND

David McCaulay
MacMillan & Company

Did you ever wonder what went on beneath the streets of a city? This designer and illustrator did, and in the course of finding out he went down into manholes, subways, tunnels, etc. He wrote and drew a book, each craft expertly done, that takes apart a typical city intersection from the pavement down. Fine for any age group, and nobody who ever reads it will see a street in the same way again.

From: most bookstores

24. UNDERSTANDING SCHOOLYARD ECOLOGY

Harry Betros
Exposition Press, 1972

A guide to schoolyard environmental

exploration for teachers. Covers topics such as the needs of plants and animals, green plants, flowers and trees, and the seasons.

From: Exposition Press, Inc., 50 Jericho Turnpike, Jericho, NY 11753

25. THE UNIVERSAL TRAVELER

Jim Bagnall and Don Koberg
William Kaufmann, Inc., 1976

This cleverly designed and delightful book calls itself a "soft-systems guide to: creativity, problem solving and the process of reaching goals," and it's not at all as scary as it sounds. Presents clear, human ways of getting over conceptual roadblocks. A real asset for working with stubborn problems, your own or other people's.

From: William Kaufmann, Inc., 1 First Street, Los Altos, CA 94022
\$5.45

26. WATERSHEDS

Peter Marshall, editor
Co-Evolution Quarterly/Penguin, 1978

A remarkable book, looking hard at something too few of us ever look at at all, much less in this depth. A collection of articles and essays examine the concept of a watershed, and its essential role in human existence. The end result is a conclusive and iron-clad documentation of the interdependence of human and natural systems.

From: most bookstores, or Co-Evolution Quarterly, Box 428, Sausalito, CA 94965
\$6.00

27. WHAT MAKES EDUCATION ENVIRONMENTAL?

Don Albrecht and Noel McInnis, editors
Data Courier, Inc. and Environmental Educators, Inc., 1975

A diverse collection of articles and essays on just what the title says it is, mixing philosophy with practicality. How and why of environmental education. Well indexed, chock full of references to other sources.

From: Data Courier, Inc., 620 5th Street, Louisville, KY 40202

28. WHO'S WHO IN BOSTON: PEOPLE AND PROGRAMS IN URBAN ENVIRONMENTAL EDUCATION

Margaret Shean Ris, Sharlene Voogd,
Jay Vogt, editors
City Sources, 1978

Responses to a questionnaire circulated by members of City Sources, Boston's urban environmental education coalition. An informal but informative guide to who's doing what around Boston.

From: City Sources, c/o Paul Fishman,
Special Programs, Harvard Graduate School of Design, Cambridge, MA 02138
\$5.00

29. YOU ARE AN ENVIRONMENT: TEACHING/LEARNING ENVIRONMENTAL ATTITUDES

Noel McInnis
Center for Curriculum Design

Theory and practice, but mostly theory on how to teach environmentally, by one of the editors of What Makes Education Environmental? McInnis begins very close to home, within himself. Good reading for anyone well into environmental philosophy.

From: Center for Curriculum Design,
Evanston, IL

PERIODICALS

Periodicals are a remarkable source of current information, and ought to be in every classroom. News magazines, newspapers like The Christian Science Monitor which go into frequent depth on environmental issues, and most importantly local papers can give students a lot to work with on special projects. Without getting into an exhaustive list, we've selected a few unusual additions to a list you may already know. Standards shouldn't be neglected (Smithsonian, Natural History, Audubon, etc.) and special interest magazines like Organic Gardening are useful. Here are a few others, less well known.

30. THE CO-EVOLUTION QUARTERLY

A thoroughly eclectic journal of things, ideas, attitudes, technology, history, and the future. This is an outgrowth of the Whole Earth Catalog, run by many of the same people. No advertising, so no pressure. Lots of reader feedback. The magazine defines environmental in the largest sense, and takes an environmental viewpoint. A goldmine of information, each issue has a catalog section on appropriate technology and communities, among other things. Great for teachers, good too for most bright high schoolers.

From: Co-Evolution Quarterly, Box 428-
Sausalito, CA 94965

31. CURRENT ENERGY AND ECOLOGY

Subtitled the "Continuing Guide to Environmental Education", this is a classroom publication intended for high school students, but it could be useful for bright middle schoolers as well. Covers current ecological issues in a news magazine format, and does background stories on aspects of environmental affairs.

From: Curriculum Innovations, Inc.,
501 Lake Forest Avenue, Highwood, IL 60040
\$3.75 per student, per school year,
15 subscription minimum

32. ENVIRONMENTAL EDUCATION REPORT

A concise monthly sampling of all that's happening in environmental education with departments covering school programs, books and films, curriculum guides, multimedia packages, and other resources. Includes feature articles.

From: Environmental Educators, Inc.

33. NEW ROOTS

This is a small journal of appropriate technology (solar, wind, etc.) published in western Massachusetts, and it keeps in touch with what goes on in ecology, energy, and environmental work in Massachusetts and New England. An access section lists current projects and people as well as good resources.

From: New Roots, Box 459, Amherst, MA
01002

34. NOT MAN APART

The bi-weekly newspaper of the environmental organization Friends of the Earth is probably the best thing of its kind. It comes out frequently enough to keep up with current events, and goes into considerable depth. A fine addition to any classroom, the magazine has a clear conservation bias but is surprisingly even handed.

From: Friends of the Earth, 529 Commercial
Street, San Francisco, CA 94111

ORGANIZATIONS AND INSTITUTIONS

STATEWIDE

35. APPALACHIAN MOUNTAIN CLUB

5 Joy Street
Boston, MA 02108

The A.M.C. primarily focuses on climbing and camping in mountain areas of New England and the eastern United States. The club offers help with the planning of an outdoor trip, consults on outdoor safety for groups, and works to develop environmental awareness. A.M.C. also operates huts and shelters in several New England mountain areas, and handles reservations for these places.

36. CULTURAL EDUCATION COLLABORATIVE

164 Newbury Street 49 Chestnut Street
Boston, MA 02116 Springfield, MA 01003
(617) 267-6254 (413) 732-1418

The collaborative is a small non-profit group whose purpose is to facilitate working relationships between cultural institutions and schools in Massachusetts. Toward this end they provide consultation and advice, small grants on occasion, and assistance in program development. The latest addition is Culture Connection, a toll free phone number hooking into a computer listing of cultural organizations, historical societies, libraries, and outdoor education centers for the use of schools. Member schools in the network pay a small charge for the service.

37. INSTITUTE FOR ENVIRONMENTAL AWARENESS

113 Beacon Street
Greenfield, MA 01301

The institute is a non-profit educational organization dedicated to programs in leadership training and research in environmental education and outdoor recreation. The institute offers a variety of custom-designed residential programs for teachers and others.

38. MASSACHUSETTS AUDUBON SOCIETY

Hatheway Environmental Education Institute
South Great Road
Lincoln, MA 01773

The M.A.S. is the most visible private non-profit environmental organization in Massachusetts, and the Hatheway Institute is its formal educational wing. The institute has an extensive library, resource collection, and a staff of trained

educators, and provides individual consultation by phone or letter. Zero In On Environmental Education is their list of publications available. The institute offers consulting services to develop small units or entire curricula for school systems in the state, at fees set for each project. In addition, the M.A.S. operates sanctuaries, nature centers, and environmental education centers across Massachusetts (some of which will be listed in this publication, see REGIONAL RESOURCES following). A complete list of these facilities is available from M.A.S.

39. MASSACHUSETTS DEPARTMENT OF AGRICULTURE

Division of Land Use
100 Cambridge Street
Boston, MA 02202

The Division of Land Use seeks to assist schools in the development of programs which promote better understanding of land use practices, and is particularly interested in school gardening programs. A regular conference of school garden coordinators is sponsored, and the division has curriculum aids and resource information available.

40. MASSACHUSETTS DEPARTMENT OF EDUCATION

The department can offer a wide variety of services, the bulk of which can best be described as advice. The most efficient way to determine how your needs can be served by the department is to bring your question to someone in your regional office (see inside back cover for addresses). If your question or inquiry needs to be answered by someone in one of the Boston offices, the regional office will help send you to the right person, with a minimum of confusion.

41. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

100 Cambridge Street
Boston, MA 02202

The department is a state resource and land managing agency with more than 120 parks and reservations statewide. A list of these, and their locations, is available.

42. MASSACHUSETTS ENVIRONMENTAL EDUCATION SOCIETY

15 State Street
Boston, MA 02109

M.E.E.S. is a volunteer society of individuals and organizations concerned with

furthering environmental education in Massachusetts. The purpose of the society is to encourage communication among professionals, recruit educators to the cause, expand environmental education activities, and inform the public of ongoing work. The society sponsors seasonal conferences, and occasional workshops. Members receive a newsletter.

43. MASSACHUSETTS FOREST AND PARK ASSOCIATION
1 Court Street
Boston, MA 02115

The association is a private lobbying group dealing with conservation legislation. It has produced many books and papers on environmental issues, which are available, and offers internships to students who seek to work in environmental action programs.

44. MASSACHUSETTS HORTICULTURAL SOCIETY
300 Massachusetts Avenue
Boston, MA 02115

The society is a membership organization devoted to the promotion of new and existing horticultural activities, including community gardening and environmental education. The society has consulted with teachers on the development of plant related curriculum units, and is operating a travelling workshop unit, available for a fee.

45. MASSACHUSETTS MARINE EDUCATORS
c/o Joseph MacQuade
12 Gerry Street
Marblehead, MA 01945

M.M.E. is a teachers' organization dedicated to sharing resources, experiences, and enthusiasm for marine education. The group attempts to develop new water-related curricula, and to infuse marine and fresh water studies into the schools at all levels. The group sponsors regular workshops, meetings, and whale watching trips. A monthly newsletter and an occasional journal are published by M.M.E.

46. NATIONAL PARK SERVICE
North Atlantic Region
15 State Street
Boston, MA 02109 (617) 223-3766

The park service administers the N.E.E.D. environmental education materials (see #99) and helps to infuse them into schools. Also, the various national

parks in Massachusetts all have environmental education staff who will endeavor to establish programs with schools from their area. The park service does teacher training, and its services are free upon request.

47. NEW ENGLAND WILDFLOWER SOCIETY
Garden In the Woods
Hemenway Road
Framingham, MA 01701

The society offers teacher training in several botanical and environmental areas, maintains a wildflower sanctuary at Garden In the Woods, offers consulting work to schools, and is in the process of developing curriculum materials for dissemination.

48. SIERRA CLUB: NEW ENGLAND CHAPTER
3 Joy Street
Boston, MA 02108

The regional office of the largest environmental organization in the country offers assistance to groups and individuals concerned about lobbying for conservation issues; publishes a newsletter; and sponsors an extensive series of events, workshops, lectures, and field trips.

49. TRUSTEES OF RESERVATIONS
224 Adams Street
Milton, MA 02186

A privately administered charitable corporation founded for the conservation, preservation, management, and protection of Massachusetts reservation lands. The trustees protect and interpret cultural and environmental values, and administer fifty-three open space and historic areas across the state. Descriptions and locations of these areas are available.

50. UNIVERSITY OF MASSACHUSETTS COOPERATIVE
EXTENSION SERVICE

Originally set up to offer agricultural college information to farmers, the extension service has grown and expanded over the years. It now has urban gardening programs, among other things, and offers information on a variety of land and agriculturally oriented topics, such as appropriate technology. Each county in the state has an office of the extension service. Consult your local telephone book.

51. YMCA/YWCA

The "Y's" of every small city or big town will often assist school groups in developing out of school activities, and have good experience in working with groups and expeditions. A good place to contact when trying to establish local support for an environmental education program in schools. Check your local telephone directory.

REGIONAL

Most of the following resources are local or regional in approach; their services or facilities are offered to a primary audience of citizens and schools within their general geographic area. Most of them, however, welcome visitors from outside these boundaries on occasion. If you are considering an expedition to a part of the state where one or more of these resources is located, don't hesitate to get in touch.

GREATER BOSTON

52. BLUE HILLS TRAILSIDE MUSEUM

Massachusetts Audubon Society
1905 Canton Avenue
Milton, MA 02186 (617) 333-0690

The museum encourages the individual to expand an awareness and appreciation of the natural environment through exhibits, lectures, courses, nature walks, and publications. Specially designed activities for school groups are available, and the museum welcomes the involvement of schools and teachers in its efforts.

53. BOSTON ZOOLOGICAL SOCIETY

Franklin Park
Boston, MA 02119 (617) 442-2002

The education department of the zoo has developed a wide range of innovative and involving programs for schools, working within the schools in some cases and bringing students to the zoo in others. The emphasis is on relating the interrelationships of animal habitats and societies to those of the students.

54. CHICKATAW BUT HILL

Box 408
Milton, MA 02186 (617) 696-0290

A Massachusetts Audubon Society sanctuary, the Hill has a strong commitment to environmental education especially work with school classes. The Hill offers workshops with the Outdoor Biology Implementation Strategies (O.B.I.S.) materials, as well as teacher training in outdoor skills and natural

history. Special programs for schools can be arranged, and the education staff will assist in the development and implementation of programs.

55. THE CHILDREN'S MUSEUM

Museum Wharf
300 Congress Street
Boston, MA 02210 (617) 426-8855

In its new home in an old warehouse, the museum continues to do superlative work in developing programs for and with schools which expand student awareness of culture and environment. Teacher training is available. Special programs can be developed around the museum's staff or facilities to tie into school curricula. Extensive lists of curriculum aids and materials are available, and the Museum Shop and Recycle Center have a lot of good things for teachers

56. HABITAT INSTITUTE FOR THE ENVIRONMENT

10 Juniper Road
Box 136
Belmont, MA 02178 (617) 489-3850

Habitat is an environmental center with a strong environmental education program located quite near Boston, on a large wildlife refuge. Regularly scheduled courses in a range of fields are given each season, and specially designed visits and arrangements with school groups can be done through the institute's program director. An excellent resource library for environmental studies, greenhouses, and nature trails.

57. HALE RESERVATION

80 Carby Street
Westwood, MA 02090 (617) 326-1770

A large outdoor and environmental education facility located near Boston, Hale provides environmental education for schools through scheduled classes and specially developed consultations. Environmental awareness is the basis for the reservation's work, but adventure and challenge components are used. Several publications for teachers, including a handbook of environmental activities, are available.

58. HUMAN ENVIRONMENT INSTITUTE

Boston University
School of Education
730 Commonwealth Avenue
Boston, MA 02215 (617) 232-0121

H.E.I. is a program of Boston University concerned with the training of education majors in techniques of outdoor and

environmental education, as well as with providing programs for schools and other groups. H.E.I. co-sponsors the fine H.U.E.S. Program (see abstract #14), and runs a residential environmental facility in New Hampshire. Staff and student teaching interns from H.E.I. will work with schools to develop appropriate programs in individual cases.

59. NEW ENGLAND AQUARIUM
Central Wharf
Boston, MA 02110 (617) 742-8830

The education staff of the aquarium will design special visits for school groups whose curriculum has centered on particular aspects of marine studies. Guided tours are always available, and long term programs and teacher training may be developed with the aquarium education staff.

60. THOMPSON EDUCATION CENTER
Thompson's Island
P.O. Box 127
Boston, MA 02127 (617) 328-3900

The offerings and operation of the Thompson Center, on Thompson's Island in Boston Harbor, are fully described in a profile included on page 20 of this publication.

NORTHEAST

61. DRUMLIN FARM EDUCATION CENTER
Great South Road
Lincoln, MA 01773 (617) 259-9807

Drumlin is a Massachusetts Audubon facility, an interpretive farm and natural history center offering standard scheduled and specially designed education programs. Farming and wild animals, agricultural and natural habitats are exhibited and explained. Several publications are available.

62. GREAT MEADOWS NATIONAL WILDLIFE REFUGE
191 Sudbury Road
Concord, MA 01742 (617) 369-5518

A resting spot for migratory birds, the refuge is an amazing place to visit during the migration periods in spring and fall. At other times of the year organized outdoor recreation and environmental education offerings are made available to schools. The Concord schools make extensive use of this facility. Occasional teacher and leader training workshops are held, and special programs may infrequently be arranged.

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63. MARINE SCIENCES INSTITUTE
Salem State College
Salem, MA 01970 (617) 745-0556 x376

The institute is a teacher training program for the development of skills and materials in marine sciences and related disciplines, attempting to encourage the infusion of marine studies into school curricula. This is offered primarily to north shore teachers, but available to all. A Teacher's Guide to Marine Education has been produced by the institute and is available.

64. MINUTEMAN NATIONAL HISTORICAL PARK
P.O. Box 160
Concord, MA 01742 (617) 484-6192

The park has an active educational component working with individuals or groups on the historical and cultural environment. Curriculum aids have been developed by the education staff, and special programs with area schools are always possible. The park's concentration is on the relevance of history, and attempts to bring alive the colonial period.

SOUTHEAST

65. CAPE COD MUSEUM OF NATURAL HISTORY
Route 6A
Brewster, MA 02631 (617) 896-3867

The offerings and operation of the Cape Cod Museum of Natural History's educational outreach program are described in this book with a profile on page 30.

66. CAPE COD OUTDOOR EDUCATION CENTER
73 White Rock Road
Yarmouth, MA 02675 (617) 362-4809

A residential outdoor and environmental education center offering staff and facilities for visits to the Cape. The center emphasizes environmental awareness through a variety of activities, geared for grades 5-9, with a flexible program designed to take advantage of differing student interests. The facility is located in a marsh and woods area, and maintains marked trails.

67. CAPE COD SEA CAMPS/CENTERS FOR LEARNING AND LIVING
Brewster, MA 02631 (617) 896-3451

The CCSC have evolved from simply a summer camp into a year round location for outside or environmental education. The special emphasis here is on natural relationships in the marine ecosystem, using their location near a fresh water lake, and adjacent to the shore, as a means of exploring the complex interdependencies of marine and land-based ecologies. Trained staff are available, and consulting staff from several Cape institutions may be called in.

68. CHILDREN'S MUSEUM/MUSEUM OUTDOORS, INC.
P.O. Box 98
1212 Russells Mills Road
Dartmouth, MA 02714 (617) 993-3361

Two facilities are concerned with promoting a better understanding of natural systems: an indoor museum with exhibits, historical and nature collections, and live animals; and an outdoor nature center with a pond and marked trails. Scheduled lessons are offered for visiting school groups, and teacher training for teachers wanting to use the facilities is available.

69. NEW ALCHEMY INSTITUTE
Box 47
Woods Hole, MA 02543 (617) 563-2655

New Alchemy is a research and development center working in the areas of self-sufficient small scale farming and energy production. They operate working experimental aquaculture and agriculture systems, and design and test solar and wind energy systems. Recently a semi-formal program of school-oriented instruction and education has been created. The institute is open for tours by arrangement, and in-school presentations may be possible. A fine field trip destination, the institute is one of the foremost centers for research into appropriate technology in the country.

70. SOUTH SHORE NATURAL SCIENCE CENTER
Jacobs Lane
Norwell, MA 02061 (617) 695-2559

An informal nature and science center with trails, exhibits, a sensory trail for blind people, and a research library. School groups may arrange guided visits or special programs. Center staff will visit schools, and teacher training is available.

71. WEB OF LIFE OUTDOOR EDUCATION CENTER
State Road
RFD #1
Plymouth, MA 02360 (617) 224-8586

The two-hundred acre outdoor center with residential facilities offers programs for teachers and schools in marine sciences, wetlands, geology, forest communities, edible plants, and other areas. An internship program exists, and programs will be tailored to school needs.

CENTRAL MASSACHUSETTS

72. WARREN CENTER
Northeastern University
529 Chestnut Street
Ashland, MA 01721 (617) 881-1142

This outdoor education and conference center for the university, offers consultation and develops programs in outdoor and environmental education. Student teaching interns from Northeastern are active in several efforts in Massachusetts, and if enough advance notice is given they will assist schools in the creation of an activity plan around the Warren Center.

73. WILDWOOD NATURE CENTER
Barre, MA 01005 (617) 355-4064

A Massachusetts Audubon center, Wildwood features special plantings which demonstrate native natural species. The center is available for school group visits, and special instruction can be scheduled. In addition, there is a residential facility where teacher training workshops may occasionally be held, and which is available for school use, when scheduled well in advance.

74. WORCESTER SCIENCE CENTER
222 Harrington Way
Worcester, MA 01604 (413) 791-9211

The center is a facility with an educational center, zoo, and omnisphere offering programs in the physical and natural sciences. School groups are encouraged to use the center, and cooperative efforts with local public schools have been developed.

SPRINGFIELD

75. ARCADIA NATURE CENTER AND WILDLIFE SANCTUARY
127 Combs Road
Easthampton, MA 01027 (413) 584-3009

Arcadia is a Massachusetts Audubon sanctuary on several hundred acres alongside the Connecticut River. Arcadia works with school groups on request, to create

programs in natural and environmental studies, history, and science. A reference collection centers on rivers, floodplains, and water studies.

76. HITCHCOCK CENTER FOR THE ENVIRONMENT
525 South Pleasant Street
Amherst, MA 01002 (413) 256-6006

A nature and environmental center with an emphasis on education, Hitchcock works closely with local schools to develop mutually valuable programs. Teacher training workshops and internship opportunities for college students from the several colleges nearby are a big part of the center's offerings, as are scheduled courses, field trips, and workshops. The center has strong experience in collaborating with schools and teachers.

77. LAUGHING BROOK EDUCATION CENTER AND SANCTUARY
789 Main Street
Hampden, MA 01036 (413) 566-3571

The center is an environmental education offering of the Massachusetts Audubon Society, concentrating on natural history and working actively with schools in its area. A staff of trained educators maintains a reference collection and works with school groups and teachers to design and implement programs using the center's facilities. The center trains teachers and volunteers regularly, and seeks out community and school involvement in its efforts.

78. NATURE'S CLASSROOM
Maple Rock Farm, RFD #1
Southbridge, MA 01550 (617) 764-8321

Nature's Classroom is a non-profit educational program which offers school groups the opportunity to study ecology in an outdoor setting, relating the standard school curriculum to practical application in the outdoors. Preparation and follow up services are available, and specially designed programs may be arranged.

79. SPRINGFIELD COLLEGE
Biology Department
Springfield, MA 01109 (413) 787-2389

While primarily concerned with training students of the college, this institution offers occasional special programs for schools or community groups, and when

a school groups' needs coincide with the teaching emphasis within the department a working arrangement may be worked out. Student interns from the college may work with local schools to develop environmental science programs.

PITTSFIELD

80. BECKETT/CHIMNEY CORNERS OUTDOOR CENTER
Y.M.C.A. Road
Beckett, MA 01223 (413) 623-8991

A large residential facility located on eight-hundred acres in the Berkshires, the Outdoor Center offers residential environmental education programs for schools, as well as teacher training workshops. These are regularly scheduled, but may be specially arranged on request.

81. BERKSHIRE GARDEN CENTER
Stockbridge, MA 01262 (413) 298-4897

This indoor and outdoor facility maintains gardens of all sorts including grains, vegetables, herbs, ornamentals, roses, and lilies. The center has a sugar house with maple sugaring production each spring, a solar greenhouse, and a special teaching greenhouse for young people. The center has worked closely with the local schools, especially in Pittsfield, to provide a variety of education offerings on a formal, scheduled basis.

82. NORTHFIELD MOUNTAIN RECREATION AND ENVIRONMENTAL CENTER
RR 1, Box 377
Northfield, MA 01360 (413) 659-3713

The Northeast Utilities hydroelectric generating station is located on Northfield Mountain, and the reclaimed mountain has been developed as a nature and environmental center, with cross country ski trails, nature trails, and scheduled activities. School groups are encouraged to visit the facility and the environmental center. Special programs can be arranged with the center's director.

83. PLEASANT VALLEY NATURE CENTER
4 Sullivan Lane
Lenox, MA 01240

A Massachusetts Audubon center, Pleasant Valley is particularly concerned with interacting within schools, and has worked closely with the Pittsfield school department to facilitate a scheduled program of visits, with center staff working in the classrooms, and classes visiting the center.

CURRICULUM RESOURCES

Where to get things, ideas, and materials, and how? And what can be done with them once you've found them? What goes into a garden or a solar panel? Where can you get slides of a distant place, or detailed maps of your own town? The first and most important point is to begin close to home. Try your local library, conservation commission, town clerk, or hall of records for histories, old and new maps, and census information. Then go further afield, to colleges and universities, or state and federal agencies. Following are some other ideas.

84. CITY GAMES

The Children's Museum and
Cambridge Seven Associates
Addison Wesley

An innovative and far-reaching curriculum package designed by The Children's Museum and a Boston area architectural firm. Activities and learning sequences for younger children, looking at many different facets of what makes a city tick.

From: The Children's Museum, Museum Wharf,
300 Congress Street, Boston, MA 02210
(617) 426-8855

85. COMMUNITY HISTORY EXPLORER'S KIT

Cynthia Kryston, editor

This work kit designed by the education specialists of Minuteman National Historical Park in Concord contains sample wills and deeds, worksheets, maps, and pictures. It's geared for the Concord area but would be valuable as an example for anyone wanting to get deeper into community history. Subtitled "A Resource Packet for Community Studies".

From: National Park Service, Minuteman
National Historical Park, P.O. Box 160,
Concord, MA 01742 (617) 369-6993

86. DIRECTORY OF ENVIRONMENTAL GROUPS IN NEW ENGLAND

A listing of all non-profit organizations devoted to protection of the environment that are currently active in New England.

From: Environmental Protection Agency,
2203 J.F.K. Federal Building, Boston, MA
02203 (617) 223-7223

87. E.C.O.S. CURRICULUM GUIDES

Lorraine B. Ide and Clifford A. Phaneuf

This ring-bound set of activities and curriculum is intended for students in grades 4, 5, and 6 participating in programs at the Environmental Center of Springfield (see profile, p. 32) but it contains many generally applicable ideas.

From: E.C.O.S., Springfield Public Schools,
195 State Street, Springfield, MA 01103

88. ENERGY EDUCATION MATERIALS

National Solar Heating and Cooling Information Center, 1978

One of several bibliographies and source lists available from this lobbying organization. The sheet lists curricula, small scale solar kits suitable for classroom demonstration, and references. Others in the series include "Films and Slides", "Solar Kit Manufacturers", "Newsletters", "Practical and Do It Yourself Projects".

From: National Solar Heating and Cooling
Information Center, P.O. Box 1607,
Rockville, MD 20850

89. ENERGY INFORMATION SERVICES

Boston Edison, Inc.

For schools in the greater Boston area, this electric utility company offers a number of curriculum aids and even class visits from company representatives. Their catalogue of services would be useful to many people regardless of location, as it lists resources available from many different sources.

From: Public Information Department, Boston
Edison, 800 Boylston Street, Boston, MA
02199 (617) 424-2000

90. ENVIRONMENTAL EDUCATION STRATEGIES

University of the State of New York, 1972

A short handbook produced by the New York State Department of Education and intended for teachers who want to begin trying out community centered environmental education efforts. The booklet covers activities, concepts, use of local materials like newspapers and community agencies, and some hints on setting up extra-curricular activities and student projects. Especially the

section on involving families and neighbors is good. Many users have appreciated the advice in this pamphlet.

From: New York State Education Department,
31 Washington Avenue, Albany, NY 12224

91. THE ENVIRONMENTALIST

A booklet detailing sources for tracking down free or inexpensive materials for use in environmental education.

From: The Environmentalist, 390 Princeton Avenue, Santa Barbara, CA 93111

92. ERIC PUBLICATIONS

ERIC (Educational Resources Information Center) is a computerized file of educational resources, with a specific environmental education subcategory. The ERIC center has a bibliography of currently available publications, and distributes periodic updates.

From: ERIC, Science, Mathematics, and Environmental Education, Ohio State University College of Education, 1200 Chambers Road, Columbus, OH 43212

93. ESSENCE

Addison Wesley

Presents environmental curriculum materials, very valid and human, which encourage high risk human teaching. The idea is that the best learning takes place where risks are taken and trust is expressed. The kit is called an "Earth Science Teachers' Preparation Project".

From: Addison Wesley (Order #6756),
Reading, MA 01867

94. EVALUATIONS OF ENVIRONMENTAL EDUCATION CURRICULUM MATERIALS

Detailed reviews of thirty environmental education curricula at all grade levels, covers most well known and popular options. Nice catalogue, if your school is considering an already prepared curriculum plan.

From: Western Pennsylvania Conservancy,
204 Fifth Avenue, Pittsburgh, PA 15222

95. FOOD CHAINS AND ECOSYSTEMS:
ECOLOGY FOR YOUNG EXPERIMENTERS

Doubleday, 1974

Thirty-nine different environmental experiments that students in the 5th through 8th grades can handle on their own with little or no supervision, with clear introductions and a good bibliography.

From: Doubleday, Department of Library Services, 245 Park Avenue, New York, NY 10017

96. HOW TO USE ERIC: ENVIRONMENTAL EDUCATION

Might be called a field guide to the computers. ERIC is a huge and mystifying system, and separating the useful from the not-so-useful isn't easy. With examples and suggestions.

From: ERIC, Science, Mathematics, and Environmental Education, Ohio State University College of Education, 1200 Chambers Road, Columbus, OH 43212

97. LADYBUGS AND LETTUCE LEAVES

This is a gardening curriculum for grades 5 and 6, designed by the staff of Project Outside/Inside in Somerville (see profile, p. 12). This and several other curriculum aids are available from the project and a list of publications can be obtained.

From: Tracy Barnes, Project Outside/Inside, Carr School, 25 Atherton Street, Somerville, MA 02143

98. A MOUNTAIN TRIP CURRICULUM RESOURCE PACKET

Newton Science Center

Newton teachers and administrators involved in operating and planning an annual trip to New Hampshire's White Mountains have collaborated on a curriculum package of the highest quality. It covers every possible aspect of a mountain field experience from administrative details to student worksheets. Applicable in many situations other than the White Mountains.

From: Newton Science Center, 88 Chestnut Street, West Newton, MA 02165
(617) 964-9810

99. NATIONAL ENVIRONMENTAL EDUCATION DEVELOPMENT

Silver Burdett Co.

This K-12 environmental education curriculum was produced by a textbook publisher in cooperation with the education specialists of the National Park Service, and it

includes both classroom and field exercises, with teacher guides. Has a good reputation for practicality.

From: Silver Burdett Co., Morristown, NJ
07960

100. O.B.I.S. (OUTDOOR BIOLOGY INSTRUCTIONAL STRATEGIES)

University of California at Berkeley

These curriculum activities come in the form of a card file including applicable ideas for many focal areas within the general rubric of outdoor biology.

From: O.B.I.S. Lawrence Hall of Science,
University of California, Berkeley, CA
94720

101. PROJECT ADVENTURE PUBLICATIONS

In addition to the book Teaching Through Adventure, already listed here, Project Adventure offers an extensive and very useful publications list, every one of which applies to curriculum building. Describes Project Adventure efforts in schools, technical manuals on building outdoor equipment, a guide to insurance liabilities for outdoor educators, and much more. A publications brochure is available from the project. (see profile, p. 36)

From: Project Adventure, Box 157, Hamilton,
MA 01936 (617) 468-1766

102. PROJECT Q.U.E.S.T.: AN ENVIRONMENTAL CURRICULUM FOR HIGH SCHOOL

The curriculum used by Project Q.U.E.S.T. (see profile, p.38). A thorough interdisciplinary approach to teaching environmental concepts through projects and classroom study.

From: Maurice Donnelly, Environmental
Studies Director, Brockton High School,
470 Forest Avenue, Brockton, MA 02401
(617) 580-7609

103. THE RESOURCE NOTEBOOK

The Children's Museum

A book about services and adventures for groups of children, with details on museums, outings, nature study workshops, libraries, crafts, and more.

From: The Children's Museum Teacher Shop,

Museum Wharf, 300 Congress Street,
Boston, MA 02210 (617) 426-8855

104. SURPLUS PROPERTY

If you qualify under I.R.S. regulations, and almost every educational institution does, you can buy surplus property from the state depot in Taunton. Typewriters, tanks, tables, tires and trucks, and everything in between. All manner of stuff floats through, and if you're outfitting an expedition or just setting up an office you might check here.

From: Massachusetts Department of Education,
Surplus Property Warehouse, c/o Paul A.
Dever State School, 1380 Bay Road
Taunton, MA 02780 (617) 824-4583

105. SOLAR ENERGY PROJECT: AN OVERVIEW

State University of New York

The text explains the project as a whole and excerpts sample exercises and curriculum sections for grades 7-12. Useful as an idea starter, and it contains some good clear plans for building model solar systems. But be forewarned, many who have tried to pry materials out of the D.O.E. have had long waits for materials. It might be worth trying your local office of the D.O.E.

From: Department of Energy, Technical Information Center, P.O. Box 52, Oak Ridge, TN 37830 or Department of Energy, 150 Causeway Street, Boston, MA 02114 (617) 223-0504

106. U.S. GOVERNMENT PRINTING OFFICE

A goldmine, the government publishes an unbelievable array of things from pamphlets on home poultry management to the congressional record. Not all of it is useful, but often interesting, and what's useful is very good. Tell them what you're interested in and they'll send you a partial bibliography. Two favorites: reprints of photographs taken by Walker Evans for the W.P.A., and a wood frame construction handbook that's as good as they come.

From: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

VISUAL MEDIA

Photographs, slide shows, films, video, and television, even the good old filmstrip can be an exciting and stimulating teaching tool, if used carefully. It doesn't have to be expensive, and as usual we suggest looking around nearby before you head off to national sources. Maybe someone from a local birding club has a slide show on the birds of your area, or someone from the community may travel frequently and take photographs. The regional offices of the Cooperative Extension Service may be able to provide visual media on land and energy issues, especially farming. Ask around town, see who takes photographs locally, perhaps a check with the town photography shop will yield a real find. Here are a few other possibilities.

107. AMERICAN FOREST INSTITUTE

Films on forests and forestry for free loan.

From: American Forest Institute, 96 Harlow Street, Bangor, ME 04401

108. APPALACHIAN MOUNTAIN CLUB

A variety of films and slide tapes on environmental areas, particularly conservation, climbing, and camping.

From: Appalachian Mountain Club, 5 Joy Street, Boston, MA 02108

109. BOSTON URBAN GARDENERS

A slide-tape of ethnic urban gardens usually planted by community groups examines links to the cultural heritage of the gardeners. A nice tour of Boston's gardens.

From: Boston Urban Gardeners, 66 Hereford Street, Boston, MA 02116

110. ENVIRONMENTAL COMMUNICATIONS

This California company has an incredible variety of films, slide collections, and video and photo materials on everything from architecture to pollution. The materials are of the highest quality, and not inexpensive. A catalogue describes everything in detail.

From: Environmental Communications, 64 Windward Avenue, Venice, CA 90291

111. ENVIRONMENTAL PROTECTION AGENCY

Government produced films on conservation, energy, pollution, and pollution control techniques, for free loan.

From: E.P.A., 2203 John F. Kennedy Building, Boston, MA 02203

112. FLORENTINE FILMS

Larry Hott, of Florentine Films, is assembling a bibliography and review of films dealing with appropriate technology and alternate energy, some of which may be available through his company.

From: Larry Hott, Florentine Films, Box 25, Amherst, MA 01002

113. MASSACHUSETTS EDUCATIONAL TELEVISION (MET)

Regularly scheduled educational television offerings often center on environmental themes, and specials may examine some issues in depth. In addition, public television series like "Nova" regularly present informative programming on environmental sciences. Information on what's available in educational television, including teacher guides to using TV and listings of series and specials, can be had through MET.

From: Massachusetts Educational Television 54 Rindge Avenue Extension, Cambridge, MA 02140 (617) 876-9800 or 155 Maple Street, Springfield, MA 01105 (413) 739-7271

V CONCLUSION

"If I could have made this enough of a book it would have had everything in it."

Hemingway, Death in the Afternoon

It is trite but strangely accurate to say that environmental education in Massachusetts is at a crossroad. Much of what makes the environmentally based work featured in this book so exciting and dynamic is the fact that it is intrinsically involved in the process of growth and change itself. This shifting, adapting cycle seems to produce a vitality absent from many other educational offerings. Because change and evolution are at the basis of any true world view, or understanding of how an ecology functions, environmental education must teach a willingness to adapt and change.

So it is fitting that the programs themselves do the same. And they do, constantly faced with tough decisions and crucial junctures.

In environmental education we have a teaching tool ideally suited to making the most of diminishing resources. It is an open option, limited only by the degree of energy with which we pursue it. In environmental education there are no answers, only more accurate and better informed questions.

OPTIONS IN ENVIRONMENTAL EDUCATION cannot provide answers, but I hope the tour has been interesting, and valuable in some way. Please use whatever support or inspiration this publication provides to do your own work, to expand and grow and struggle. Share. Learn. Live.

RESOURCES FOR SCHOOLS FEEDBACK

Please take a minute to tell us what you think about Resources For Schools # _____ (specify number). Your comments will help us improve future editions in the Resources For Schools series.

- 1) What is your role in education? check one: teacher _____, parent _____, administrator _____, student _____, other _____ (please specify).
- 2) How did you receive this publication? check one: in the mail (unrequested) _____, borrowed from a colleague _____, picked up at the Department of Education central _____, or regional _____ office, requested from the Dissemination Project _____, other _____ (please specify)
- 3) If you requested this publication, why did you request it? _____
_____ Did it meet your needs? _____
- 4) What did you find useful about the publication? _____

- 5) What didn't you find useful about the publication? _____

- 6) Have you used any of the information contained in the publication? _____ If so, how? _____

- 7) Have you any suggestions for future Resources For Schools topics? _____

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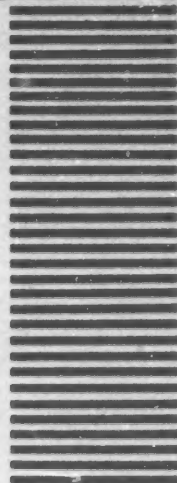
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Staff in the regional education centers can also
be contacted for more information:

GREATER BOSTON REGIONAL EDUCATION CENTER
54 Rindge Avenue Extension
Cambridge, MA 02140
(617) 547-7472

SPRINGFIELD REGIONAL EDUCATION CENTER
155 Maple Street
Springfield, MA 01105
(413) 739-7271

CENTRAL MASSACHUSETTS REGIONAL EDUCATION CENTER
Beaman Street, Route 140
West Boylston, MA 01583
(617) 835-6267

NORTHEAST REGIONAL EDUCATION CENTER
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Hathorne Avenue
Hathorne, MA 01937 (617) 777-3502
Temporary location:
Danvers State Hospital
Route 62
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SOUTHEAST REGIONAL EDUCATION CENTER
Mailing address:
P.O. Box 29
Middleboro, MA 02346 (617) 947-3240
Location:
Lakeville State Hospital
Route 105
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188 South Street
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